FOOD MANUFACTURE

Vol. XIX, No. 3 March 1, 1944

Contents

	Page
Editorial	77
Road Transport of Food. H. Scott Hall, M.I.A.E., M.I.T.A.	81
Food Standards	85
Controlled Atmosphere Cabinet	86
Ultracentrifugal Studies	86
Fluorescence Analysis in the Food Industry. Part III. J. A. Radley, M.Sc., F.I.C.	87
The Pasteurisation of Milk. John G. Davis, D.Sc., Ph.D., F.I.C.	91
Food Analysis. Part I. D. W. Grover, B.Sc., A.I.C.	92
The Vitamins. F. A. Robinson, M.Sc.Tech., F.I.C.	96
Society of Agricultural Bacteriologists	98
Ergot and "Bloody" Bread. M. Schofield, M.A.	99
The British Fishing Industry	101
Dehydrated Eggs in Canada. Henry B. Bees	103
News	104
Information and Advice	113
Recent Patents, Trade Marks and New Companies	114

Published on the first day of the Month

by

LEONARD HILL LIMITED

17, Stratford Place, London, W.1

Telephone: Mayfair 7383

SUBSCRIPTION

Single Copies	1s.
Annual Subscription	10s.
Abroad	12s. 6d.

The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

Sublimation Method of Dehydration

THE dehydration of meat from the frozen state under high vacuum and dehydration by infra-red radiation are two of the newest developments in the field of experimental meat processing in the U.S.A. In December the F. J. Stokes Machine Company revealed some information about its low temperature or sublimation process of dehydration, states *The National Provisioner* (108, 24, 11).

The dehydration process developed by the Stokes organisation in co-operation with Dr. Earl Flosdorf of the University of Pennsylvania, is similar to the sublimation method used in preserving blood plasma. In a pilot plant Dr. Flosdorf has produced dehydrated peas, carrots, string beans, lima beans, beets, coffee, cranberries, and other foods which Army officials and food experts have pronounced superior to foods treated by other dehydration processes. Pork dehydrated by the process, it is stated, is actually more tender and of better flavour than the fresh product. By the Stokes process, the food product being dehydrated becomes a very light, porous framework of its former self, since the water is removed while the food stands in trays under vacuum within the low micron range at a temperature of between 20° to 40° F. below zero.

The sublimation process is said to be particularly useful in connection with food products in which delicate flavours and other elements are easily destroyed. Drying from the frozen state, first applied in the preparation of sera, was formerly an expensive operation, but the development of new equipment has greatly reduced costs, and it is stated that this has brought the application of the process within the reach of the food industry by the development of new and more efficient types of high-vacuum pumps and other equipment.

Dehydration by Infra-red Radiation

The investigation of infra-red dehydration of meat and vegetables was carried out in the chemical engineering laboratories at Vanderbilt University. The experiments were done in an oven with sheet metal walls. Insulating board was sometimes used to cover the top to restrict the air flow and raise the oven air temperature. General Electric

250-watt infra-red reflector lamps were used in the experiments. The lamps were placed 5-6 inches apart on 60° centres, and this arrangement gave a heat density of about 2,500 B.t.u. per hour per square foot.

The pork and beef were cut into ¼-inch pieces and pre-cooked at 160° F. for thirty minutes. After draining, the meat was placed on a screen in the oven. The air temperature in the oven was brought to a constant point prior to introducing the meat.

Using oven temperatures of 187° F. for beef and 192° F. for pork, dehydration was completed in 20-22 minutes. Complete dehydration reduced the moisture content to 0·03-0·40 lb. per lb. of dry solids. On reconstitution the products regained their original moisture in about fifteen minutes and it is reported that their flavour and keeping properties were good.

Manganese in Nutrition

M. N. Rudra mentions in *Nature* (Vol. 153, pp. 111-112) that rabbits kept on a synthetic diet of purified ingredients not containing manganese developed abnormal appetites, ceased to grow normally, and began to die off. The abnormal appetite was most strikingly exemplified by a propensity to eat one another's fur; and when one animal of a group of four died, the survivors ate its viscera. The control animals receiving a diet containing manganese did not exhibit any such unusual behaviour. It appears that the depraved appetite was due to an instinctive search for the manganese the animals lacked. Post-mortem examination of animals on the manganese-free diet revealed hæmorrhages of lungs, liver, and intestinal capillaries.

The Peeling of Potatoes

Somebody recently asked in a letter to a paper why, if peeling potatoes caused such a loss in nutritive value, there was such a lot of time spent upon the operation in the Army.

The vexed question whether potatoes lose much of their "goodness" if they are peeled has received some illumination from the work of Jane M. Leichsenring and Eva G. Donelson (*Food Research*, Vol. 8, 1943, pp. 194-201; *Biol. Abs.*, Vol. 17, p. 2174). The paper deals mainly with the effects of treatment with the usual fertilisers and sulphate of iron on the calcium, phosphorus and iron contents of the tubers. Paring the tubers resulted in significant losses of the total calcium and iron—respectively 24 and 10 per cent. being removed in the peel. On the other hand, phosphorus appears to be concentrated in the medulla, since higher values for over-all phosphorus concentration were obtained in peeled than in unpeeled tubers.

A Rare Sugar as Food

A note in the *Analyst* of December, 1943, after J. Leibowitz (*Nature*, Vol. 152, 1943, p. 141) points out that manna of the Sinai desert is a mixture of sucrose and invert sugar formed by the activities of scale insects on the leaves of a tamarisk. Recent examination of a similar manna used in northern Iraq in its natural form (a syrupy or semi-crystalline mass) as a substitute for sugar has shown that the sugar fraction consisted mainly of the rare disaccharide trehalose, already known from another manna and other sources. The manna examined by Leibowitz contained 30-45 per cent. of trehalose calculated on total dry solids, equivalent to up to 80 per cent. of the total carbohydrate content. The rare sugar was isolated after elimination of the fermentable sugars by yeast.

Cleansing of Milk Bottles

May not all the efforts of the authorities to see that the milk going into bottles is as clean as possible be stultified by inefficient methods of washing, filling and distributing them? asks G. Lapage, *Nature*, 153, **3870**, 31. He then proceeds to cite the result of an enquiry which was carried out by the Ministry of Health between October, 1937, and July, 1939, by G. S. Wilson and Betty C. Hobbs. A total of 2,406 milk bottles from 105 washing and distributing plants of 26 different types was examined. It was found that the spray type of washing machine was the best, and that the best results were obtained without brushes. Virtual sterility could be obtained with either strong caustic soda at low temperature or with weak caustic soda at high temperature. One interesting result was that the detergent killed all coliform bacilli. Of the organisms found in the washed bottles about half were saprophytic, one quarter were cocci and one quarter were yeasts, moulds, hæmophilic organisms and aerobic spore bearers. These, like the coliform bacilli, would have been killed by the detergent and must have got into the bottles after they had left it.

Army Food Handlers and Salmonella Poisoning

Twelve food poisoning outbreaks in the Panama Canal zone and isolation of various species of Salmonella from eleven of them is reported in *Amer. J. Pub. Health*, 33, **6**, 706-8. The author states that there was a direct correlation between the strains isolated from food-handler carriers and the cases of food poisoning, but (as pointed out in the *Bulletin of War Medicine*, Medical Research Council, 4, **4**, 217) no facts in support of these statements are given except that the removal of the carriers from duty stopped the occurrence of

the infections. As part of the special laboratory investigation, 6,617 stool specimens from 2,000 individuals were examined. Of this group of subjects, 49 (2·45 per cent.) were found to be carriers of intestinal pathogenic bacteria, 4 were carriers of *Bact. typhosum*, 40 of other Salmonella strains and 5 of Shigella (3 Sonne, 2 Flexner). Of the 44 Salmonella carriers, 2 carried *Bact. paratyphosum B*, 12 *Bact. paratyphosum B*, var. *java*, 4 *Bact. typhosum*, 5 *typhimurium*, 6 *Bact. newport*, and the rest various Salmonella strains.

Of the 44 carriers of Salmonella, 16 were soldiers and 28 civilians; 23 were from the Fort Clayton command and were mainly associated with *Bact. paratyphosum B*, var. *java*. The medical history of most of the food handlers was negative for gastro-intestinal symptoms and for a history of food poisoning or of diarrhœa.

Dr. M. G. Savage suggests that the author uses the term food poisoning in a very wide sense, and includes both typhoid and paratyphoid infections, which were present in 18 of the carriers. This is unfortunate, as, while human carriers are the common cause of infection with enteric diseases, human food-handler carriers—in temperate zones, at least—are extremely rare as sources of acute Salmonella food poisoning. Detailed evidence of human carriers in such outbreaks in the tropics would have been very valuable.

Pork Products

The improvement which takes place this month in the pork content of sausages is partly due to the beneficial effect on the pig population of the double ration of feeding-stuffs issued to farrowing sows. That increase took effect on January 1. A certain amount of imported pork is also being allocated to food manufacturers. The higher food value and better flavour of the new sausages is expected to result in an increased demand, but it is doubtful whether the Ministry of Food can increase the quantity as well as the quality.

The full effect of the feeding-stuffs concession on the pig population will not become apparent for another two or three months. For some time past more than 80 per cent. of the home output of pigs has been converted into bacon, but as Canada is continuing to supply four-fifths of Britain's bacon requirements and the Ministry has no desire to increase the ration, it is believed in trade circles that most of the extra home-produced pigs this year will be used for purposes other than curing. A useful share of the supply is expected to be consumed as pork to ease the problem of maintaining the meat ration.

Most of the pigs used for that purpose would probably be much more suitable for curing than are most of those that now find their way to the bacon factories. The wartime baconer of 12-14 sc. lb. deadweight is a very different animal from the pre-war baconer of 8-9 sc. lb. The present heavyweight contains a much higher proportion of fat and is not nearly so well suited to modern mild curing requirements as was the pre-war pig. The heavier animal also raises technical problems in the curing factory. The national food position is better than it was a year ago. Improvement in the quality of sausages and other pork products is considered to be preferable to an increase in the output of bacon of wartime standard.

The Blackening of Cooked Potatoes

In an article published in *Agriculture*, 50, 9, 425, Drs. T. Wallace and R. L. Wain, of Long Ashton Research Station, Bristol, have examined the problem of blackening during the cooking of potatoes. The cause of blackening has been attributed to the formation of melanin, following the oxidation of tyrosine by the enzyme tyrosinase, and two years ago Robinson attributed the black colour to the formation of ferric iron (probably black oxide). The percursor of the black pigment is regarded as possibly being ferrous iron in loose combination with proteins which are hydrolysed on boiling, and probably to the hydroxide which is subsequently oxidised.

In view of the fact that blackening has frequently been associated with potash deficiency in the soil, and more especially where this deficiency exists in conjunction with high nitrogen status, resulting in a wide N/K ratio, field experiments were carried out at Long Ashton station which showed that, in addition to blackening resulting from a potash deficiency, the condition may be brought about by a deficiency of phosphate and possibly of calcium. These latter results are of particular importance at present, when large areas of poor, acid land deficient in phosphate are being broken up and planted with potatoes.

A sand culture experiment was carried out in which single potato tubers of the variety Sharpe's Express were grown in quartz sand contained in 10-in. waxed clay pots and fed by means of nutrient solutions. In one set of experiments complete nutrients were given and five trials were run, omitting nitrogen, phosphorus, calcium, magnesium and potassium respectively. In these tests typical blackening occurred in one sample only—phosphorus omitted—but those tubers in the sample where calcium was omitted also showed purplish and brownish discolorations. There was no blackening where potassium was omitted. The authors state that it appears from these two experiments that the typical blackening of potato tubers on cooking may occur from two conditions:

(1) A deficiency of potash (accentuated by high nitrogen) as shown in the field test; and (2) a deficiency of phosphate as shown both in the field trial and in the sand cultures.

The discoloration resulting from calcium defi-

ciency may not be the typical blackening noted in the above two cases.

If blackening follows the accumulation of iron it may occur in different ways in the cases of potash and phosphate deficiencies. With potash deficiency there is no evidence that the intake of iron by the plant is increased, but it is known that iron tends to become immobile within the plant; this is due to excessive oxidation, and it accumulates at points such as nodes. The fact that blackening does not occur from potash deficiency in the sand culture suggests that the problem is complicated. A deficiency of phosphate, on the other hand, may result in increased absorption of iron by the plant and increased mobility of the element within the plant, since in both cases phosphate acts as a precipitant. These two facts might thus be expected to result in a high total iron content of the plant tissues where phosphate is deficient. Since iron is more readily soluble in soils with increasing acidity and acid soils provide conditions where both calcium and phosphate are likely to be deficient, it would appear that these two factors should receive attention in addition to potash where acid soils are being ploughed for potato culture.

"Unconsidered Trifles" in Food

A note in *Nature* (Vol. 153, 1944, pp. 99-100) by Sir J. C. Drummond and Dr. T. Moran gives some information about minor constituents of what are sometimes regarded as minor foods. The note is a preliminary to a fuller communication, and is especially concerned with the vitamin B_2 (riboflavin) and niacin (nicotinic acid) contents of beer and some non-alcoholic stimulant beverages and their raw materials. The riboflavin content of beer is of the order of one microgram (μ) per cubic centimetre. If the riboflavin were completely extracted from the malt a beer having about 1·3μ per ml. would result; in strong beers this figure may be exceeded. Tea has been shown to contain about 10μ of riboflavin per gram, but coffee and cocoa have only a quarter or a fifth as much. A single cup of tea may provide about 10μ of riboflavin even if no milk is added. It is implied that the widespread consumption of beer and tea may suggest why signs of riboflavin deficiency are relatively rare in this country, though not uncommon in the United States. This may be so, but it will be remembered that the *per capita* consumption of milk and of ice cream is higher in the United States than here; on the other hand, a high average figure does not exclude the possibility of there being people who consume only small amounts of milk products and no beer and for whom coffee may not supply sufficient riboflavin. Though the authors do not make the point, their figures suggest a reason for the preference shown by some people for a "good strong cup o' tea" as a reviver; tea brewed on the hob may have its riboflavin—as well as its caffein and tannin—almost completely extracted.

"Consideration of the methods of manufacturing meat extracts" (say the authors) "suggests that there would be a considerable leaching out" of riboflavin and nicotinic acid into the extracts. This appears to be the case, since five well-known proprietary brands of meat extract have riboflavin and nicotinic acid values in the ranges of 15·4-25·8 and 410-1,025 μ/gm. respectively. A breakfast cup of these extracts would provide on the average 0·2 mgm. of riboflavin and 7 mgm. nicotinic acid. These quantities are by no means insignificant. It is possible that the relatively high nicotinic acid content of meat extracts may prove to be related to their reputation as stimulants. The recent work of Frankau (*Brit. Med. J.*, November 13, 1943) is of interest in this connexion. The authors point out that any concentration of vitamins in extract means a corresponding poverty in corned beef. The importance of the riboflavin content of malt extracts is also indicated.

Cherished Oyster

With English oyster beds no longer stocked in these war years, many a nostalgic longing for that relished morsel will have to remain unsatisfied. The tale of the oyster and its "cultivation", beginning with the Romans at Lake Lucrin and continuing right up to the Ministry's experimental tanks in the Conway Estuary and at Lympstone, is one matching fiction in its bright episodes. It was a brave man who first swallowed alive that luckless bivalve—"a piece of machinery, and going machinery too", as Huxley described the morsel "which is and is gone, like a flash of gustatory summer lightning." So strong did man's gastronomic liking for it become, that in one year 70 million oysters were taken from the Bay of Cancale, that paradise for French oysters, and extinction was threatened until Professor Costé studied "spat", foresaw cultivation grounds, and got Napoleon III so enthusiastic that an Imperial oyster park was constituted.

France showed the way, too, at Arcachon where 500 million oysters could be gathered in one year—all because an unknown seaman, unhonoured and unsung, suggested roofing tiles as collectors for the young oyster, and the mason Michelet of Arcachon introduced the perfect "tile."

So the oyster cycle goes on: the laying of millions of eggs with the new and full moon; the protection of young oysters in "ambulances" or shallow boxes; the fattening basins or "Bassins de dégorgement", where with valves open and "a wery good power o' suction" as Sam Weller said, oysters are encouraged to eat good plankton food and grow fat—so that they in turn may be eaten!

Road Transport of Food

PROGRESS IN 1943

H. SCOTT HALL, M.I.A.E., M.I.T.A.

TWO YEARS ago the author referred to the first Government road haulage plan, and last year he reported its passing, which was unaccompanied by regrets. At the same time a new scheme was described which, though it cannot be said to have arisen, Phœnix-like, from the ashes of the old one, was at least designed to replace it, and was to be put into operation forthwith.

Another year has passed. At the time of writing, criticisms of the scheme by traders and hauliers alike are being countered by the plea that the scheme is not yet in working order, that when it is all cause for complaint will cease to be.

"Tramping" the Country

That simple statement of fact is in itself so biting a commentary on the scheme, so complete a demonstration of the speed and efficiency of Government methods as applied to road transport as almost to obviate the need for further discussion. There may, however, be those who would like to know wherein the trouble lies. It appears to be that the vehicles operated under the scheme are being misused in precisely the same manner as those in the "Chartered Fleet" in the former plan. Complaints are rife that the empty running of these vehicles is greatly in excess of that to be expected in normal use, and that, instead of being used economically on trade routes, they are "tramping" the country, to poor purpose so far as load conveyance is concerned.

One incident for which the author personally can vouch does illuminate the position. A lorry, fully loaded, put in at the manufacturer's service depot for some attention. On examination it was decided that it would be safe to run the vehicle for a few hours before the necessity for the attention became urgent. The driver was therefore recommended to proceed to his journey's end, deliver the load, and call in on the return journey to have the work done.

"Oh," he replied, "I daren't do that. I'm working under the Government, and when I drop this load I may have to go on to anywhere in the kingdom; it's ten to one I shall not come back this way."

However, by this time next year—that is, after two years of operation—these "teething troubles" may be on the way to being cured, and some sort of satisfactory working, as well as, possibly, savings in fuel and rubber, may be in process of being achieved.

The truth of the matter is, of course, that road transport is not amenable to Government control, with its inevitable time lag between promise and fulfilment. The essential characteristic of road transport, its pre-eminent advantage, is its flexibility and adaptability to immediate and changing needs. It loses that whenever its control passes from the individual operator, who can make personal contacts, consider each problem on the spot, and give prompt decisions and quick and ready service.

Furthermore, it seems reasonable to suppose that the essential economies in fuel and tyres, all that the scheme was designed to effect, could really have been achieved by co-operation between the road transport users and the Regional Traffic Commissioners and their staffs, with no need for the top-heavy and expensive bureaucratic edifice which has had to be erected in order to take care of the Government scheme.

However, there are signs that other needs are likely to take priority of those relating to petrol and tyres. Road transport is to be called upon once more to step

Fig. 1.—Rear view of an Austin 5-tonner with van body for food distribution.

Fig. 2. — A Foden 6-wheeler built for the transport of Batchelor's Peas.

into the breach and play again a particularly active part in promoting the war effort. For certain reasons the pressure upon the railways has considerably increased of late, to such an extent indeed that one of the main-line companies has recently had to refuse all traffic other than that placed upon it by Government departments. The most pregnant indication of what is now to come was the well-authenticated report that coal could not be moved from collieries because the railways were too congested to deal with it. The upshot is that there is a very definite and positive prospect that more and more use will have to be made of road transport in the near future. The period of this growing demand is estimated at not less than nine months and probably longer. Readers will do well, therefore, to put their transport departments in such order as will enable them to deal with increasing traffics. In the absence of such precautions they may be caught short of very essential transport facilities.

Zoning

Government intervention in transport, having as its object the saving of fuel and rubber, has in other ways been beneficial and really helpful. The author refers in particular to a development which was mentioned a year ago—namely, the zoning of traffic—whereby manufacturers are only permitted to distribute their products within an area specifically limited in extent. The procedure followed has not been revised to any substantial degree since a year ago, and, bearing that in mind as well as the fact that reference to these limitations of distribution have from time to time had reference in the columns of FOOD MANUFACTURE, there is no need to dwell upon it to any great extent now.

An example of the method of procedure adopted in connection with sausages may be cited. In order to relieve both road and rail transport and reduce, so far as possible, the risks to perishable goods then passing over long distances, the Ministry of Food asked the Food Manufacturers' Federation, as a matter of urgency, to arrange as between manufacturers of sausages, meat pies, and other open-pack meat products for voluntary interchange of customers or other suitable arrangements for deliveries from the nearest possible point, cutting out long hauls and cross hauls. Needless to say, the essential co-operation was immediately forthcoming and zoning carried out.

Latest Type Vehicles

Notwithstanding difficulties in the way of supplies, labour shortage and Ministerial restrictions on other than military activities, the leading manufacturers of commercial motor vehicles have nevertheless been able to effect certain improvements in their chassis during the past year. Of these the following are examples and serve to show that the interests of food manufacturers in this direction are not being neglected.

Fordson and Thames commercial vehicles produced

Fig. 3.—A Morris Commercial 30-cwt. vehicle for distribution of cakes.

Fig. 4.—An Albion 6/7½-ton plain platform lorry carrying a detachable container, especially adapted to facilitate the conveyance of grain.

under the Government Scheme to ensure that a certain output of commercial vehicles is maintained for essential civilian requirements include several of special interest to manufacturers and wholesalers in the food industries. Particularly suitable are the covered truck on the Thames 4- and 5-ton chassis of 143½-in. wheelbase and the Fordson 10-cwt. van. Articulated vehicles are available for heavier loads.

The Thames chassis provides 14 ft. 4 ins. of load space behind the cab for its 5-ton pay-load. As a covered truck with a strong and rigid tilt enclosed at the rear by weather and tailboard curtains, it contains no less than 560 cu. ft. of loading space. In its open form the truck has detachable sides and tailboard, 1 ft. 7¾ ins. in height. With either type of body this truck is in the 30-m.p.h. class.

It is of the forward control type, so that, notwithstanding its large body capacity, the complete vehicle is compact and handy. The overall length is only a fraction over 20 ft., while the turning circle is 52 ft.

It is powered with the Ford 8-cylinder engine of 30 h.p., which by now is so well known as to need no description. The clutch is a special one of the semi-centrifugal type, and the rear axle is fully floating.

Tyre equipment, an important matter in these days of scarcity of new tyres, is 32 by 6 ins. heavy duty, twins on the rear, single in front. The cab is comfortable and well ventilated and embodies an instrument panel on which are mounted a full complement of modern and easily read instruments.

The Fordson 10-cwt. van is also notable for its generous body capacity, which is 120 cu. ft. The floor space is 6 ft. 7 ins. in length, 4 ft. 6 ins. wide, and the height is 3 ft. 9½ ins. This van has the Ford 4-cylinder side-valve engine, which is notable for its economy in fuel consumption. The tyres on this chassis are 5·00 by 18 ins. all round.

Thornycroft vehicles for civilian use are restricted to two types, known as the "Nippy" for a pay-load of 3 tons and the "Sturdy" with a pay-load of 5 to 6 tons. A further restriction is in respect of wheelbase, those available being 10 ft. 1⅛ in. in the case of the Nippy and 13 ft. 4 ins. in the case of the Sturdy.

Both types are manufactured with forward control, and the body length from the back of the cab to the end of the frame is 11 ft. 10 ins. and 16 ft. 0 ins. respectively. In the case of the latter chassis, the body may overhang the end of the frame by a further 1 ft. 2 ins., thus making it possible to fit a body rather larger than usual.

Improvements in 1943

Improvements since last year have naturally been to some degree controlled by the materials which are available. Even so it has been found possible to make certain modifications, chiefly resulting in improving the running qualities of the engine, reducing wear for an equal amount of service, and so effecting an economy in maintenance costs and giving the customer greater satisfaction.

One of the improvements has been redesign of the combustion chamber of the engine, certain changes in the design of the manifold, valve ports and valve tappet gear, which resulted in greater efficiency and quieter running, at the same time increasing the power output from 60 to 65 B.H.P.

There has been some slight improvement in the design of the radiator, partly with the object of improving appearance, but also to provide for filling the radiator from within the cab through a hinged lid in the cowling.

The Austin Motor Company are, for the time being, concentrating on the production of a 5-tonner. Points in its attraction are efficient engine cooling so as to ensure the maximum power output being available under all conditions. The cylinder jackets are unusually deep and the fan-cooled radiator is of ample capacity. Satisfactory lubrication is ensured by the use of a positive-action gear-type pump forcing oil under pressure to all important bearings. In addition to the floating filter in the oil sump, a large by-pass filter is incorporated in the oiling system, placed at the rear of the engine. The brakes are Lockheed hydraulic with large-diameter drums. In general the chassis has been designed to enable general maintenance to be undertaken with the least loss of time, so that operators can rely on having their vehicles on the road for the maximum percentage of their life.

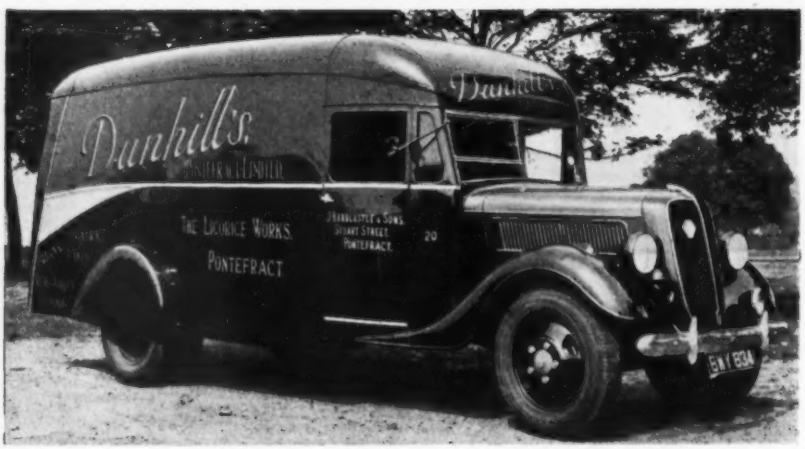


Fig. 5.—A van of Ford manufacture for a well-known Yorkshire maker of confections of all kinds.

Morris Commercial have decided to concentrate on the 3½-ton and 30-cwt. general delivery van. The 30-cwt. van follows closely the specification of the pre-war "Equi-Load" standard van. A loading capacity of approximately 275 cu. ft. is provided in the body, which is 10 ft. 8 ins. long, 5 ft. high, and 5 ft. 2 ins. wide. A noteworthy feature is the design of the rear end; outrigger hinges for the half-doors hung above a tailboard made to lower on chains permits full-width opening.

Oil Contamination

Prejudice, like superstition, dies hard, but during the past year the author has come across several food manufacturers who, in attempting to differentiate between petrol- and oil-engined vehicles, have chosen petrol, on the ground that the exhaust gas from Diesel engines is liable to contaminate food products.

As a matter of fact, precisely the reverse is the case, as was definitely demonstrated some years ago when the Diesel engine for road transport was much less familiar than it is to-day and it was necessary immediately to answer any challenge as to its suitability for any class of work. Certain experiments were carried out and were made comparative by the use of exhaust gases from:

1. An oil engine using a standard heavy fuel oil.
2. Petrol engine using petrol containing lead tetrethyl.
3. Petrol engine using ordinary commercial petrol.

In the course of the experiments samples of foodstuffs enumerated below were exposed to the exhaust from engines using fuel as above described. The samples of foodstuffs were contained in each of three large tin boxes, one set in each. In each experiment the exhaust gases were allowed to blow for half an hour directly into the boxes containing the foodstuffs, which were not wrapped or covered in any way. At the end of this time the boxes were closed with lids and taken to the laboratory, where they were opened and the foodstuffs smelt and tasted.

Fruit, bread, sweets and milk were found to be slightly effected in smell, but not at all in taste. Cream cakes were slightly tainted both in smell and taste. Margarine and bacon were more strongly affected.

It was agreed by all who examined the samples that, where they were tainted at all, the effect produced by petrol exhausts was much more disagreeable than that produced by heavy-oil exhaust.

The lids were again put on the boxes, which were then left for three days. On opening them again, the smell of the exhaust gases was just discernible in the ethyl petrol exhaust and had practically disappeared in the others; the taint in the margarine and bacon, however, although materially lessened, could yet be detected.

Fig. 6.—A Thornycroft used in the distribution of bread.

Samples of the exhaust gases were collected and analysed, with the results shown in Table A.

TABLE A

	Fuel Oil.	*Commercial Petrol.*	*Leaded Tetrethyl Petrol.*
Carbon monoxide ...	None	0·2	0·4
Carbon dioxide ...	3·1	4·3	3·8
Oxygen	16·1	13·0	15·0
Nitrogen	80·8	82·5	80·8
	100·0	100·0	100·0

In the opinion of the chemist who conducted it, the very severe test above described established the fact that contamination from the Diesel engine exhaust is less objectionable than that from a petrol engine exhaust.

A further test was then made which, while more severe, more nearly approximated to the conditions likely to occur when motors were actually being used for the conveyance and delivery of foodstuffs.

A set of samples of food—cream cakes, bread, biscuits, milk, meat and butter—was placed on the back of a standing lorry with its engine working. The samples were placed at a point above the exhaust pipe, so as to be in line with the rising exhaust. A similar set of samples was placed about a foot away from the end of the exhaust pipe, though not in the direct line of the flow of gas. The samples remained exposed for an hour, and at the end of this time none of them gave any indication of contamination either in smell or taste.

The above is, in effect, the report of the consulting chemists and analysts, and the results are decisive enough to answer any question which may be raised as to the effect of oil engine exhaust on food, bearing in mind that in normal circumstances food conveyed on a vehicle is not subjected to contact with exhaust fumes to anything like the extent provided for in these experiments.

Producer Gas

As regards the use of producer gas equipment, little material progress has been made since a year ago. There have been some detail modifications in the Government standard plant, designed to reduce the cost of maintenance and to make some of the essential parts more accessible.

As to the economic aspect of the use of these plants, a Scottish opinion may well be quoted. A leading operator at a meeting in Glasgow recently stated that he was definitely of the opinion that to-day practical operators should not be asked to fit gas producers. The use of producer gas equipment meant a considerable tonnage reduction when they could ill afford to lose a pound, and their man-power problems would be trebled and their operating efficiency reduced. This view was confirmed by several large and influential operators who were present at the meeting.

Electric Vehicles

The potentialities of the electric vehicle for local distribution must never be overlooked, and in this connexion it is of importance to note that a specification of a standard type of battery electric vehicle has during this year been submitted to the Ministry of Supply by the Standardisation Sub-Committee of the Electric Vehicle Association of Great Britain. Some eight manufacturers contributed to the development of this model, which is to have a pay-load capacity of 1 ton. Every part is standardised and all components are interchangeable. The chassis frame is of simple but strong design with cross-members upon which the body is directly mounted, the front being dropped to afford easy access to the driver's seat. The motor is an 8 h.p. and the controller is of the delay-action type with foot-operated hydraulic mechanism, and provides progressive acceleration. There is direct transmission from the motor to the back axle through a short one-piece tubular shaft, and the back axle itself is of the double-reduction type with three-quarter floating shafts. The brakes are Lockheed-operated Girling. Tyres are 23 ins. by 5 ins. high-pressure. A feature of the cab is that interchangeable canvas side screens are provided in place of doors.

Food Standards

UNDER the powers conferred by the Defence (Sale of Food) Regulations, 1943 (S.R. & O. 1943, No. 1553), the Minister of Food has made the Food Standards (General Provisions) Order, 1944 (No. 42), and separate Orders prescribing standards for each of the following foods: self-raising flour, baking powder and golden raising powder, shredded suet and mustard. These Orders are the first to be issued creating legal standards for foods in accordance with the policy announced in the White Paper on "The Labelling and Advertising of Foods". (Cmd. 6482.)

The General Provisions Order, which applies to all standards prescribed under Regulation 2 of the Defence (Sale of Food) Regulations, makes it an offence to sell a food for which a standard is prescribed unless the food complies with that standard. It is also an offence to sell a food which is so described as to lead an intending purchaser to believe that he is purchasing food of a description for which a standard is in force, unless it complies with the standard.

A warranty defence and the defence that some other person is responsible for the commission of the alleged offence, similar to the corresponding defences in the Food and Drugs Act, 1938, are provided for the protection of retailers. The provisions relating to taking samples and powers of inspection contained in the Defence (Sale of Food) Regulations, 1943, apply to proceedings in respect of offences against the Food Standards Orders. Under the Regulations, also, enforcement is entrusted to food and drugs authorities, but whereas proceedings in respect of offences against the Regulations may not, in general, be instituted by authorities unless the Minister's prior consent is obtained, it is provided in each of the four commodity Standards Orders now issued that consent is not necessary for prosecutions for infringements of the standards.

The following are summaries of the standards prescribed:

A. The Food Standards (Baking Powder and Golden Raising Powder) Order, 1944 (S.R. & O. 1944, No. 46).

Baking Powder: Not less than 8 per cent. of available carbon dioxide and not more than 1·5 per cent. of residual carbon dioxide.

Golden Raising Powder: Not less than 6 per cent. of available carbon dioxide and not more than 1·5 per cent. of residual carbon dioxide.

In these two instances the definitions of "available" and "residual" carbon dioxide are based on a detailed indication of the method of determination.

B. The Food Standards (Mustard) Order, 1944 (S.R. & O. 1944, No. 43).

Mustard of any description in Powder Form: To consist of a blend of brown and white mustard flours without the addition of any other substances, and to yield not less than 0·35 per cent. of allyl *iso*thiocyanate after maceration with water for two hours at 37° C.

Compound Mustard or Mustard Condiment: To consist of a blend of brown and white mustard flours with not more than 20 per cent. of amylaceous flours and spices, and to yield not less than 0·35 per cent. of allyl *iso*thiocyanate after maceration with water for two hours at 37° C.

The standards do not apply to white mustard flour sold under the description "pickling mustard", nor to brown mustard flour sold under the description "brown mustard".

C. The Food Standards (Self-Raising Flour) Order, 1944 (S.R. & O. 1944, No. 44).

Self-Raising Flour: Not less than 0·45 per cent. of available carbon dioxide and not more than 0·65 per cent. of total carbon dioxide. Definitions of "available" and "total" carbon dioxide, based on a brief indication of the methods by which they are to be determined, are included.

D. The Food Standards (Shredded Suet) Order, 1944 (S.R. & O. 1944, No. 45).

Shredded Suet: Not less than 83 per cent. of fat.

These Orders come into operation as from March 16 on sales by manufacturers, on May 16 on sales by wholesalers, and on sales by retailers will be effective on July 16, 1944.

Controlled Atmosphere Cabinet

TEMPERATURES, those of the Arctic to those of the Equator as well as higher and lower, are provided in a new design of cabinet worked out by Mr. L. C. Cartwright and presented by Dr. Foster D. Snell. Mr. Cartwright described it in a paper read before the Agricultural and Food Chemistry Division of the American Chemical Society. The humidity is independently controlled and may vary from the dryness of the air at five miles in the air to that of the steaming jungle. As designed, the apparatus is assembled largely from non-critical materials such as glass and fibreboard.

Such equipment serves to determine the performance of rubber parts in an airplane in the stratosphere, as well as the moisture permeability of food packages designed to be stored for months and then used by our fighting forces. In another application, vapours to which workmen may be exposed are released in controlled concentrations in the cabinet and their reaction on animals determined by observation through a multi-pane glass door, either for a few minutes or, if necessary, for days and even weeks.

Ultracentrifugal Studies

THE ultracentrifuge which has yielded much pertinent information on the size and shape of protein molecules has now yielded new information on the nature of the starch molecules. It has been known that most starches consist of two components—one, a long chain of glucose molecules tied together in the shape of a helical spring and called amylose, and the other a network of short chains highly branched and called amylopectin.

By a method of separating these components and studying the rate at which they settle in the ultracentrifuge under a force of almost 200,000 times that of gravity it was shown that actually three components exist in corn starch. One is amylose and the other two are amylopectin, but they have widely different sizes. The light fraction has a molecular weight of about half a million, and the heavier about five million. The experimental evidence shows these to be real single molecules and not small ones clumped together.

While in the past starch was always treated as a single substance which could be technically modified to give products suitable for various purposes, the recognition of these components may lead to their separation on an industrial scale, and the individual components may find more scientific application because of their widely different properties. One may look forward to these components and their derivatives taking their place with synthetic polymers (resins and plastics) to fulfil certain special needs.

A milestone in the history of the chemistry of starch is the synthesis of the starch by Hanes in 1939. By means of an enzyme, phosphorylase, extracted from peas or potatoes, Hanes was able to produce a material that had the properties of the helical amylose. This experiment has been repeated by others and by ourselves. Our studies have revealed that, although synthetic starch is chemically the same as natural amylose, the sizes differ in much the same way that synthetic rubber differs from natural rubber. The molecules of natural amylose all have about the same size (molecular weight about 80,000), while the molecules of synthetic amylose in any one sample have a range of sizes (about 100,000 to 200,000). Furthermore, the sizes of the synthetic starch depend on the nature of the impurities that are present as activators of the synthesis. The cost of synthesising starch is at present prohibitive and cannot compete with natural starch.

The branched chain amylopectin which constitutes about 70 to 75 per cent. of the natural starch has as yet not been synthesised. Whether the enzyme phosphorylase behaves differently in the living plant or whether there exists an as yet undiscovered enzyme which is specific for its synthesis are questions to be settled by future work.

Abstract of papers read by C. O. Beckmann, R. I. Dunlap and T. G. Fox at the 106th national meeting of the American Chemical Society.

ERRATUM

IN the first paragraph of Mr. L. D. Galloway's review of *Microbiology and Man*, published in the February issue of FOOD MANUFACTURE, page 64, it was stated that the book was published last July, but this should have been July, 1942.

Fluorescence Analysis in the Food Industry

PART III

J. A. RADLEY, M.Sc., F.I.C.

Eggs and Egg Products

SHELL eggs show a dull reddish fluorescence due to traces of porphyrin on the outside of the shell. As the egg ages so this fluorescence colour gradually changes to blue or disappears.[167, 168] The fluorescence intensity varies not only between eggs from different breeds and individual birds of the same breed, but eggs from the same bird may vary in initial intensity. However, J. Straub and co-workers[163, 164] conclude that an appreciable number of eggs with a blue fluorescence in a batch indicates a minimum age of at least a month. Surface treatment of eggs with preserving agents will, of course, exert a marked influence on the fluorescence shown by eggs thus treated; therefore the lamp gives uncertain results. The fluorescence of frozen eggs is said to appear more reddish than that of fresh eggs. A method of estimating the age of eggs, introduced by J. E. H. Waegeningh and J. Heesterman,[165, 166] is based on the increase in the intensity of fluorescence shown by the white on ageing. Whether this is due to the same changes that bring about the increase in inorganic phosphate on storage is not known.[169] The egg white is compared against a set of standard gelatine solutions containing 0·1 to 12·5 per cent. gelatine. Eggs 16 days old usually match the 0·25 per cent. gelatine standard, and after 120 days the 12·5 per cent. standard.

Powdered Dried Egg

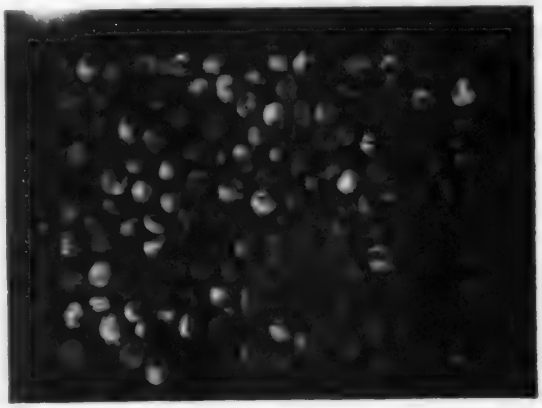
Powdered dried egg shows a biscuit-coloured fluorescence in mass, which changes to a bluish fluorescence in very thin layers. Pressed into a mould, it shows a similar fluorescence to that shown by custard powder, but the latter has one or two distinguishing features. For example, custard powder shows not only a biscuit-coloured fluorescence but deep purple shadows between the particles when not closely compressed. Bright fluorescing particles show the presence of flavouring agent. It should be possible, by the examination of the batch under the lamp, to follow the distribution of the flavouring agent in custard powders as the mixing proceeds. The same procedure as is adopted for counting specks in starch could be used. This would involve taking a sample of the mix, spreading on paper and covering with a sheet of glass, then counting the brightly fluorescing particles in a certain area, noting their size and distribution. Other work on eggs is mentioned in the bibliography, and a number of papers deal with the detection of removal of mark of origin[180-183] or other treatments such as washing, freezing or preservation.[170-183]

Cereal Foods

No information has been published on the fluorescence of cereal foods such as the various corn flakes and "Shredded Wheat" preparations. These show bluish, yellowish, biscuit-coloured and various shades of bright brown fluorescing particles. On some flakes or shreds nearly all these shades appear and closely follow the colour in daylight, the practically white portions appearing blue, the light yellow portions yellow, and so on. Information on the age of the food might be obtained by extracting the fatty matter with a solvent, and examining the extract (*a*) in bulk and (*b*) after spotting on filter paper.

Various strains of barley which appear similar in daylight can be divided into different groups according as they show green, blue or violet fluorescence colours,[184] and seeds damaged by mould growth can be picked out.[185-187] The fluorescent specks shown by bacterial colonies and fungi on seeds after storage are generally brilliant, but invariably disappear when the seeds are dried. Whether the fluorescence returns upon re-moistening and keeping for a short time has apparently not been tried, but if this were the case it might be of interest for detecting infected seeds and prevent their being processed, and possibly infecting an otherwise clean batch (*vide* supra cheese fungi). With many types of peas or beans old seeds can be distinguished from the new, as the latter often show characteristic bright-coloured fluorescence effects absent from the old samples. Wheat, barley and rye grains, however, allow of no distinction between old and new seeds.[188].

In view of the addition of grain other than wheat to grain for national flour, the observation of J. Grosbüsch[192] is of interest. He found that when bread was extracted with 70 per cent. alcohol and the extract spotted on to filter paper, allowed to dry, and examined under the lamp, the wheat bread spot was inert, whereas that from rye bread showed an intense green fluorescence. A blank test should be carried out with



Peas showing moulds.

the alcohol used as this sometimes contains fluorescent denaturing agents. On adding Fehling's solutions to the spots the fluorescence colours were reddish blue and yellow respectively. Grosbüsch claims that 10 per cent. of rye in wheat bread is detectable by this method. Treatment of flour with nitrogen peroxide or with chlorine compounds may be detected, according to Mogos,[193] by extracting the flour with ether when the extract from a treated flour shows a much weaker fluorescence. Before leaving the subject of flour it is interesting to note that the additions of dried white of egg to the extent of two or more eggs per pound of flour leads to the development of a weak blue fluorescence.[194]

Confectionery

Impure raw sugar has a yellowish fluorescence, and some coloured sugars such as coarse loaf sugar appear almost white. The more sugar is purified the more pronounced becomes its violet appearance, no fluorescence being shown by pure sugar. The presence of impurities causes the violet fluorescence to become darker, and a difference in ash content of a fraction of a per cent. causes an appreciable change in the fluorescent appearance.[195] By making up standards containing known amounts of these impurities, it is said to be possible to estimate, with a fair degree of accuracy, the purity of an unknown sugar. This claim, however, should be treated with reserve,[196] for the origin of the product probably plays an important part in determining the presence or otherwise of any impurities of which the number, constitution and effect on the fluorescence of the sugar are all, at present, indeterminate.[197, 198] Other workers have[199-206] examined sugar products at all stages of manufacture, lemonades and syrups,[207] and molasses,[208] with a view to obtaining rapid plant control. Data connecting fluorescence of these products with hydrogen-ion concentration, ash-content, etc., are available,[202] and those interested in this subject are referred to the original papers. Tests for individual sugars, glycerol, additions to jams and other substances of interest to those dealing with confectionery products are dealt with later. The examination of honey under the lamp seems to offer no particular advantages.

Detection and Estimation of Inorganic Compounds

The micro-analytical methods introduced in recent years require only minute samples of material for analysis. The accuracy and reproducibility of the results are, in many cases, equal to those obtained by the older macro methods. A subsection of micro-analysis is that in which a fluorescent end product, detectable in ultra-violet light, is formed. At some time or other food chemists, water analysts, agricultural chemists, and others whose work is closely connected with the food industry or nutrition, desire to detect the presence of minute amounts of inorganic or organic compounds such as metallic contaminations, preservatives, etc.

To consider this branch of the work thoroughly is beyond the scope of this article so that only a selection of the more interesting can be made. Those interested and wishing to follow up the method in detail are referred to the literature.

Aluminium

There are several reagents for the detection of traces of aluminium, the best of which allows detection in concentrations as low as $1 : 10^6$, whilst fluorescent titrations can be carried out at concentrations of $1 : 10^7$. The colouring matter of morin, in neutral or acetic acid solution, gives an intense green fluorescence with aluminium.[209] The test solution is precipitated with a drop of caustic soda solution, filtered, and a drop of filtrate placed on a black porcelain tile and acidified with 2N acetic acid, followed by the addition of one drop of a saturated solution of morin in methyl alcohol. Under the lamp an intense green fluorescence develops in the presence of aluminium. If other metals are absent the preliminary alkali treatment can be omitted. The limit of sensitivity of the test is 0·2 gamma in a limiting concentration of 1 : 250,000. Using filter paper impregnated with morin extract and dried spotting with the test liquid, drying the spot and covering it with a drop of 2N hydrochloric acid, the sensitivity is increased to 0·005 gamma at a concentration of $1 : 10^8$. G. Beck[213, 214] finds this reaction is also given by beryllium, zirconium, gallium and scandium.

Another test due to C. E. White and C. S. Lowe[213] relies on the development of a brilliant orange red fluorescence with 0·5 c.c. of a 0·1 per cent. solution of Solochrome Dark Blue B in the presence of acetic acid. The author[211] has found that several other dyestuffs give brilliant reactions with aluminium, which can thus be detected in the presence of zinc and magnesium. The test solution is made slightly acid, and an equal volume of a 0·2 per cent. solution of Solochrome Violet RS or Solochrome Red ERS is added, the liquid boiled, cooled and diluted with an equal volume of ethanol and examined under the lamp. Using 0·1 c.c. of test solution containing $1 : 10^6$ of aluminium a bright orange fluorescence is obtained. Fluorides or hexavalent chromium interferes with the test, and a preliminary precipitation with caustic soda is advisable if iron or copper is suspected to be present also.

The morin reaction has been put on a quantitative basis by A. Okac,[210] who titrates aluminium chloride solution containing morin extract with alkali fluoride solutions in the presence of sodium chloride. The brilliant greenish fluorescence fades directly all the aluminium has been converted to the alumino-fluoride. Davydov and Devekki have examined the *determination* of aluminium by the Alizarin S and by White and Lowe's method and consider both are unsuitable. They place 5 ml. of the test solution in a 15 ml. nephelometer and add 2·8 ml. of a sodium acetate/hydrochloric acid buffer to give a final pH value of approx. 4·8. Alcohol, 3·6 ml., quercetin (0·1 per cent. solution) 2 ml. are added and the whole diluted to 14 ml. The aluminium content is found from a calibration curve, which is constructed by using various amounts of titrated aluminium solution.

Arsenic

A. A. King[215] has pointed out that if the mercuric chloride paper used in the Gutzeit test is examined under the lamp then the presence of small traces of arsenic, insufficient to cause a visible colour in daylight, is readily seen by the appearance of dark patches. As little as 0·000,001 gm. of arsenic can be detected by this method.

Boron and Borates

J. Szebellédy and Gaal[216] have elaborated a test for boron in which the test liquid is buffered with a phosphate buffer to within *p*H 5·8 to 6·9 and 0·5 per cent. tincture of cochineal is added. The sensitivity of the reaction is 12 gamma in 0·5 c.c. of solution and, used as a micro test, in which 10 mgms. sodium acetate are dissolved in 0·1 c.c. of test solution (as a buffer) and a drop of cochineal extract added, it is possible to detect 0·5 gamma in 0·025 c.c. The first worker and St. Tanay[217] have examined Feigl and Krumholz's Alizarin S test for boron and find that it can be used to detect as little as 0·02 gamma of boron. Their tests were carried out in the presence of 22 common cations and anions, and in most cases there was little or no interference. Iodine can seriously interfere and must be removed with silver sulphate powder. Chlorates interfere, and may be removed by adding formaldehyde; antimony is prevented from interfering by the addition of chlorine water.

Bromine and Bromides in the Presence of Chlorides

As seawater contains small quantities of bromides the detection of these in the presence of chlorides is important in determining whether spoilage of foodstuffs is due to seawater or not. Nascent bromine converts the dyestuff fluorescein, which is highly fluorescent, into cosin, which as a dry stain is not. Ganassini[218] and also Hahn[219] consider as little as 10^{-6} gm. of bromine can be thus detected. The material under examination is mixed with acetic acid and lead peroxide and heated in a test tube closed with a capillary of 2 mm. diameter, capped with the fluorescein stained filter paper. W. M. Seaber[220] liberated the bromine by means of a 20 per cent. solution of ammonium persulphate. The test is made quantitative by this worker by comparing the stain with a series of standard stains produced by known amounts of bromine. J. Grant [221] has shown that the sensitivity of this method is such that 0·0017 mgm. of bromine is readily visible.

Inorganic Chlorides in the Presence of Organic Chlorides

Organic compounds containing halogens, such as chloroform, bromoform, chloral, etc., do not affect the fluorescence of uranyl sulphate, but the presence of mineral halogens represses this fluorescence in an amount which is inversely proportional to the chemical equivalent of the repressive ion for a given amount of uranyl sulphate. Y. Volmar[222] therefore proposes to use this both for the detection of inorganic halogens in the presence of organic halogen and for the estimation of the former.

Magnesium

With magnesium, zinc and cadmium, 8-hydroxy quinoline forms derivatives which are intensely fluorescent, so much so that they have useful commercial applications. A few drops of a 0·5 per cent. solution of 8-hydroxyquinoline in methyl alcohol added to a solution containing magnesium, strontium, calcium, lithium, cadmium, thorium, or zinc gives either a solution which is powerfully fluorescent, or a strong fluorescent precipitate, providing the *p*H value of the solution is suitable.[223] The conditions for precipitating magnesium with 8-hydroxyquinoline are well known to analysts, and can be used on a micro scale by examination in ultra-violet light when 0·025 gamma of the metal in solution is detectable, and the same applies to the test with zinc.

Zinc

A more specific test for zinc in solution is the bright green fluorescence developed, if it is first made alkaline with caustic soda then made just acid with acetic acid, followed by the addition of a few drops of a solution of urobilin.[224] Appreciable amounts of copper should not be present if this test is to be successful.[225, 226]

The author has used several dyestuffs for the fluorescent detection of zinc, but four give a somewhat similar reaction with aluminium. The only one we need discuss here is the dyestufl Solochrome Red ERS. In neutral solution in 50/50 aqueous alcohol the addition of a few drops of a 0·1 per cent. solution of Solochrome Red ERS, followed by heating to the boil and cooling, gives a brilliant orange red fluorescence if *aluminium* is present even in the presence of comparatively large amounts of zinc, magnesium or beryllium salts. If a zinc salt is present in the absence of aluminium a dull blue-red fluorescing solution is obtained. However, on spotting the solution on to filter paper and drying, the spot from an aluminium-containing solution gives only a very weak pale yellow fluorescence, whereas the *zinc* solution gives a brilliant orange yellow fluorescence. By carrying out the test first in the liquid state and then on filter paper, zinc and aluminium can be detected in the presence of each other. The zinc test can be carried out in neutral or alkaline solution, whereas the aluminium test requires to be done in a neutral or slightly acid solution.

Non-Specific Tests[227]

When potassium iodide and pyridine are added to a solution of a *lead salt*, containing as little as 0·25 gamma of lead, a white precipitate of $Pb(C_5H_5N)I_2$ is thrown down which has a strong yellow brown fluorescence under the lamp.

In the presence of 0·5 gamma of *copper* in solution naphthoflavone absorbs iodine when potassium iodide is added to the copper salt/naphthoflavone mixture and the original bright fluorescence of the naphthoflavone disappears. Any other substance which oxidises iodine will, however, give this test. With cochineal solution the presence of 0·1 gamma of copper suffices to change the fluorescence from red to a faint bluish white, but the presence of lead (gold and palladium also) interferes with the test.

The orange red fluorescence of rhodamine B in acid solution disappears upon the addition of as little as 0·5 gamma of *antimony*. In the presence of hydrochloric acid antimony gives a strong yellowish green fluorescence with morin extract when only 0·05 gamma is present. H. Göto has used Cerulin to detect tin, a yellowish green fluorescence being obtained with only 0·02 gamma of this metal in solution.

Iron has a strong depressing effect on any fluorescent compound with which it can combine, and the deep violet fluorescence of salicylic acid in a buffered acetate solution is destroyed upon the addition of as little as 2·5 gamma of ferric iron. Only 0·25 gamma has a

similar effect on the fluorescence of naphthoflavone in the presence of potassium iodide, but other compounds give this test.

Calcium can be detected by the yellowish green fluorescence with morin in the presence of caustic soda and the fluorescent precipitate with oxine in ammonia. Sodium is detected by the well-known zinc uranyl acetate method. Only when present to an extent greater than 5 gm. per litre do salts of copper, cadmium, mercury, cobalt, nickel, aluminium, manganese, strontium, barium, magnesium or ammonia interfere. The sensitivity of the test is greatly increased under the lamp, and by using alcoholic solutions or carrying out the test as a spot test on filter paper, sodium is readily detected in potassium salt.

J. Grant[228] has found that the sensitivity of matching of sulphide—*e.g.*, cadmium, bismuth, arsenic, lead and antimony—where hydrogen sulphide is added to an acid solution of the sample, is considerably increased when carried out under the lamp, allowing the determination of 0·0001 to 0·001 mgm. of antimony. L. T. Fairhall and L. Prodan[229] were able to determine 1 part of cadmium in 2,500,000 in a similar manner.

The compound resazurin is converted to resorufin, in the presence of alkali carbonate, by the addition of *hydrosulphite* and certain other *reducing agents*,[230, 231] and the fluorescence changes from brown, through colourless to red. *Nitrites*, but not *nitrates* give a red fluorescence on the addition of Magdala red.[232]

Oxidising agents, such as chlorates and potassium nitrate in milk, can be detected[234] by treating the milk with sulphuric acid and stannous chloride in the cold, and after centrifuging a green fluorescence develops in the presence of chlorates (12 p.p.m. chlorine) or higher amounts of potassium nitrate or hydrogen peroxide.

Quinine in solution shows a feeble blue fluorescence, whereas that of the sulphate is most intense light blue.[233] Grant and Booth[235] use this fact for the estimation of sulphur dioxide in foodstuffs. The sulphur dioxide is liberated in the usual manner and passed into a mixture of 5 ml. water, 1 ml. pure 40-volume hydrogen peroxide and 0·5 ml. of a saturated quinine solution. There it is oxidised to sulphuric acid and the brilliant fluorescence of quinine sulphate appears. As little as 0·25 mgm. of sulphur dioxide, and by a suitable modification of the method, 0·1 mgm. of sulphide sulphur is thus detectable.

REFERENCES

[125] W. Schmandt, *Zeit. angew. Chem.*, 1929, **42**, 1039 (Detection of extracted cocoa butter).

[126] W. T. Field, *Analyst*, 1930, **55**, 745 (Detection of extracted cocoa butter).

[127] A. Castiglioni, *Ann. Falsif.*, 1935, **28**, 24 (Detection of extracted cocoa butter).

[128] J. Ripert, *ibid.*, 1929, **22**, 459 (Detection of additions to cocoa butter).

[129] W. Sproesser, *Chem. Umschau Fette, Oele, Wachse, Harze*, 1928, **35**, 325 (Fluorescence spectra of cocoa butter).

[130] H. P. Kaufmann, *Zeit. angew. Chem.*, 1928, **41**, 1123 (Cocoa butter).

[131] D. van Roon, *Chem. Weekblad*, 1929, **26**, 576 (Cocoa butter).

[132] E. A. Mauersberger, *Chem. Ztg.*, 1932, **56**, 861 (Effect of refining on cocoa butter).

[133] J. Volmar, *J. Pharm. Chim.*, 1927, **5**, 435 (Milk, decrease in fluorescence with heating foods).

[134] K. Schützler, *Milchwirtsch. Forsch.*, 1927, **4**, 352 (Milk presence of certain metals modifies fluorescence).

[135] Kieferle, *Suddeutsche Molkerei Ztg.*, 1928, Dec. 13, **50** (Evening less fluorescent than morning milk).

[136] O. Gerngross and M. Schulz, *Milchwirtsch. Forsch.*, 1928, **6**, 567 (Milk).

[137] J. Spolverini, *Riv. Ital. di Actinologia*, 1927, **2**, No. 9 (Milks of different animals compared).

[138] J. Spolverini, *ibid.*, 1927, **2**, 1 (Milks of different animals compared).

[139] F. Tallo and B. Albanese, *Riv. Sanitaria Siciliana*, 1930, Vol. 18 (Milks of different animals compared).

[140] O. Mezger. *et al.*, *Suddeutsche Molkerei Ztg.*, 1929, 1360 (Changes in fluorescence of milk).

[141] J. A. Radley, *Analyst*, 1933, **58**, 527 (Milks, cream and cheese analysis).

[142] J. A. Radley, "*Fluorescence Analysis in Ultra Violet Light*", Diss., London, 1933 (Milk, cream and cheese analysis).

[143] G. Hermann, *Zeit. Fleisch u. Milchhyg.*, 1937, **47**, 258 (Change in milk fluorescence on heat treatment).

[144] S. Kaloyéréas, *Compt. rend. Congr. int. tech. chim. ind. agr.*, 1937, **2**, 346 (Detection of goat—in cow milk).

[145] L. E. Boober, *Jour. Biol. Chem.*, 1935, **107**, 591 (Test of fluorescence in milk investigated).

[146] K. Würster, *Zeit. Milchyhyg.*, 1930, **11**, 379 (Fluorescence carrier in milk investigated).

[147] O. Warburg and W. Christian, *Ber.*, 1936, **69B**, 228 (Effect of sunlight on milk).

[148] R. C. Wright and E. B. Anderson, *Analyst*, 1938, **63**, 252 (Detection of hypochlorite in milk).

[149] S. Rothenfusser, *Zeit. Unters. Lebensm.*, 1930, **60**, 94 (Effect of heating on fluorescence of milk).

[150] F. M. Litterscheid, *ibid.*, 1927, **53**, 263 (Detection of external contamination of milk).

[151] J. Stark, *Alpenland Molkerei-u. Kaserei Ztg.*, 1931, **5**, 4 (Detection of external contamination of milk).

[152] K. Braunsdorf, *Zeit. Unters. Lebensm.*, 1932, **63**, 308 (Natural coffee cream, effect of fat content and heat treatment).

[153] D. Migliacci, *Boll. Chim. farmac.*, 1928, **67**, 673 (Milk and cheese).

[154] L. Vogeler, *Molkerei Ztg.*, 1930, **44**, 1797 (Milk and cheese).

[155] T. Baumgärtel, *ibid.*, 1931, **45**, 141 (Milk and Cheese).

[156] Iguchi *et al.*, *Milchkontrolle*, 1929, **2**, 151 (Milk and cheese).

[157] A. Karsten, *Zeit. Fleisch-u. Milchhyg.*, 1935, **45**, 301 (Milk and meat).

[158] R. Müller, *Klin. Woch.*, 1937, **16**, 807 (Effects of diet on fluorescence of human milk).

[159] J. M. Rieck, *Gordian Zeit. f. Kakosgewinnung usw.*, 1929, **35**, 827, 828 (Cocoa butter).

[160] H. Fincke, "*Die Kakaoprüfung und ihre Verfalschung*", Abschnitt I, Stuttgart, 1929 (Cocoa butter).

[161] J. Grossfeld, *Zeit. Unters. Lebensm.*, 1931, **62**, 441 (Cocoa butter).

[162] Colombier and Chaize, *Ann. Falsif.*, 1928, **21**, 91 (Detection of adulterants in cocoa butter).

[163] J. Straub *et al.*, *Chem. Weekblad*, 1937, **34**, 372 (Age of eggs).

164 J. Straub, *ibid.*, 1938, **35**, 739 (Age of eggs).
165 J. Waegeningh and J. E. Heesterman, *ibid.*, 1927, **24**, 622; 1932, **29**, 134, 138, 650 (Age of eggs).
166 J. E. Heesterman, *Zeit. Unters. Lebensm.*, 1933, **66**, 309 (Age of eggs).
167 Wehner, *Deut. Landswirt. Geflügel.-Ztg.*, 1930, No. 11 (Age of eggs).
168 G. Gaggermeier, *Arb. Reichsgesundheitsamt*, 1932, **65**, 105, 221 (Age of eggs).
169 C. F. Van Oyen, *Cold Storage*, March 19, 1936 (Testing eggs).
170 C. Zach, *Mitt. Lebensm. Hyg.*, 1929, **20**, 209 (Estimation of age of preserved eggs uncertain).
171 H. Bierry and B. Gouzon, *Compt. rend.*, 1932, **194**, 653 (Fluorescence spectra of egg shells).
172 A. Schrempt, *Zeit. Unters. Lebensm.*, 1933, **65**, 647 (Eggs).
173 F. W. Vilter and O. Schmidt, *ibid.*, 1933, **65**, 649 (Eggs).
174 A. Tapernoux, *Compt. rend.*, 1932, **194**, 653 (Distinguishing between preserved and fresh eggs).
175 K. Braunsdorf, *Zeit. Unters. Lebensm.*, 1934, **67**, 451 (Eggs, recommend Heesterman's test).
176 H. Mohler and J. Hartnagel, *Mitt. Lebensm. Hyg.*, 1934, **25**, 265 (Eggs, recommend Heesterman's test).
177 A. R. Tankard, *Analyst*, 1938, **63**, 815 (Water treatment does not simulate acid treatment of eggs).
178 J. J. Dingemans, *Chem. Weekblad*, 1931, **28**, 350 (Frozen eggs).
179 J. J. Dingemans, *ibid.*, 1932, **29**, 138 (Frozen eggs redder than fresh eggs).
180 T. Cockburn, *Analyst*, 1930, **55**, 42 (Detection of removal of mark of origin).
181 Anon., *The Glasgow Bulletin*, 1929, Oct. 11 (Detection of removal of mark of origin).
182 K. Elbe *et al.*, *Zeit. Unters. Lebensm.*, 1933, **65**, 100 (Detection of removal of mark of origin).
183 K. Braunsdorf and H. Brinckmeier, *ibid*, 1933, **66**, 301 (Detection of removal of mark of origin).
184 F. Albrecht, *Woch Brau.*, 1927, **44**, 459 (Differentiating barley strains).
185 A. Niethammer, *Zeit. Unters. Lebensm.*, 1929, **57**, 354 (Distinguishing between old and new seeds).
186 R. Nesini, *Prag. Arch. f. Tiedmed.*, 1933, **12**, 237 (Bacterial and mould colonies on seeds).
187 R. Nesini, *Tierarzt. Rundschau*, 1933, **39**, 266 (Bacterial and mould colonies on seeds).
188 R. Nesini, *Zeit. Unters. Lebensm.*, 1934, **67**, 195 (Bacterial and mould colonies on seeds).
189 M. Haitinger and Reich, *Fortschr. d. Landsw.*, 1928, **3**, 433 (Distinguishing between infected and sound seeds).
190 M. Haitinger and Reich, *Mühle*, 1929, **66**, No. 41 (Distinguishing between infected and sound seeds).
191 E. Berliner and R. Ruter, *Zeit. ges. Getreide-u. Muhlenwessen*, 1929, **5**, 203 (Distinguishing between infected and sound seeds).
192 J. Grosbüsch, *Zeit. Anal. Chem.*, 1934, **99**, 12 (Detection of rye in wheat bread).
193 H. Mogos, Thesis, *Univ. Pharm.*, Paris, 1931 (Detection of treatment of flour with oxidising agents).
194 J. Tillmans *et al.*, *Zeit. Unters. Lebensm.*, 1930, **60**, 61 (Detection of eggs in flour).
195 H. Lundén, *Zeit. angew. Chem.*, 1928, **41**, 199 (Fluorescence of sugars examined using colour filters).
196 S. J. Lewis, *Nature*, 1939, **143**, 316 (Sugars).
197 O. Spengler, *Zeit. angew. Chem.*, 1928, **41**, 194 (Disagrees with Lundén ref. 195).
198 K. Sandéra, *Zeit. Zuckerind., Czechoslav.*, 1927, **51**, 237 (Disagrees with Lundén, ref. 195).
199 G. Mezzadroli and Vareton, Atti III., Cong. *Naz. Chim. pura e. appl.* (Firenze e. Toscana), 1929, 580 (Sugar).
200 A. Brieghel-Müller, *Z. Ver. Deut. Zuckerind.*, 1932, **82**, 141 (Sugar products).
201 G. Gérard, *Ann. Falsif.*, 1932, **25**, 212 (Sugar products).
202 M. Déribéré, *Bull. Assoc. Chim.*, 1938, **55**, No. 2 (Sugar products).
203 H. Lundén *et al.*, *Svensk., Sockerfabr. Forenings*, 1927, March 22, p. 3 (*p*H values, ash content and fluorescence of sugars).
204 G. Mezzadroli and Vareton, *Ind. suc. Ital.*, 1929, **22**, 3 (Sugar manufacture).
205 B. Zimmermann, *Zeit. Zuckerind. Czechoslav.*, 1930, **54**, 405 (Sugar refining).

(To be continued)

NOTE.—References in the text not included in the above list will be found in the next instalment.

The Pasteurisation of Milk

CONSIDERING the importance of this subject, the paucity of books is rather surprising. Mr. Harry Hill is a sanitary inspector well known for his literary interest in milk, and so the publication of a volume* by him on a subject in which the public health, legal and engineering aspects of milk are intimately combined is a matter of some interest to the dairy industry in general and to sanitary inspectors in particular.

In the preface he states that "the author's aim has been to answer all critical statements by emphasising the need for efficient pasteurisation of all milk for the general well-being of the community at large". The ten chapters of the book cover 152 pages and deal with the necessity for pasteurisation, criticisms, plant design, in-bottle, high temperature-short time and other types of heat treatment, bottles and their fillers and washers, and cleaning and control measures.

The book is written in a simple and popular style. It does not pretend to be deeply scientific; in fact, compared with Wilson's book it would appear superficial. It does, however, cover the practical aspects of plant control very well and contains many useful hints for sanitary inspectors and creamery operatives. The advice given may be regarded as a counsel of perfection; the reviewer has not yet come across a dairy which conforms to the requirements of Mr. Hill. The book would form an excellent basis for a course of lectures to sanitary inspectors and others interested in the plant control side of the problem.

The most serious omission from the book is the

* *Pasteurisation*. By Harry Hill. Pp. 152. London. 10s.

absence of photographs, diagrams and tables. If a second edition is called for, we strongly recommend Mr. Hill to supply these in abundance.

The book also suffers from the absence of references and the looseness of some of the statements. There are a few slips in proof-reading. Some scientific data are inaccurate; for example, the definition of an Angstrom unit is a thousand times too small, and there is some confusion in the description of the resazurin tests. Some of the sentences are not clear and the ideas badly expressed. For example (p. 4): "This retardation of souring has probably caused critics of the system to state that pasteurisation is practised in order that the keeping quality of milk may be prolonged. This accusation might have been true in the early stages of development, but this cannot be said to apply at the present time." We are not clear as to the precise meaning of these sentences, but the implications are at any rate inaccurate. On the same page appears the statement, "The nutritive value of such [pasteurised] milk is equal to that of the raw variety. . . ." This is not only inaccurate (there is a slight loss of vitamins C and B_1), but contradicts the author's statements elsewhere. The conclusions about T.B. in T.T. milk (p. 10) are statistically meaningless. Some of the bacteriological data are rather sweeping; others are so vague that they have little value. We are particularly interested in the statement (p. 96) that in "continuous-flow pasteurisers the movements of bacteria have been known to interfere with the flow". They must have been very powerful bacteria! We are also interested in the use of 3½ per cent. caustic soda solution for washing bottles. This might be efficient, but is possibly rather drastic and also expensive.

The chapter on "control measures" is the weakest in the book, and one feels that the author has copied out statements from bacteriological books without having an adequate grasp of the subject. It is a pity that the author did not get a scientific colleague to read the manuscript.

The different methods of pasteurising milk are quite fairly described, but more emphasis should have been laid on the superior keeping quality of in-bottle pasteurised milk.

The most valuable part of the book is the practical information on plant control and the sanitary inspector's aspect of dairy routine.

J. G. Davis.

Food Analysis

PART I

PROGRESS IN 1943

D. W. GROVER, B.Sc., A.I.C.

IT WOULD indeed be pleasant to record some startling advance in the technique of food analysis, but the manner in which this technique must develop makes the recognition of such an advance in an annual review almost impossible. New methods must necessarily be subject to a healthy scepticism until thoroughly proved and improved, processes which may occupy years of painstaking work. The reviewer is confined therefore to recording occasionally the unobtrusive beginning of a new method, the bulk of his material being the aforementioned painstaking and detailed experimental work on already known methods.

Ashing Temperatures

Work on the proper temperature for ashing foodstuffs has been published over a number of years, and two more papers have appeared recently.[1, 2] Definite recommendations are made that ashing should be carried out between 550° and 600° C. This is based on earlier work on the losses of carbon dioxide from alkali and alkaline earth carbonates, and is confirmed by collaborative tests made at various temperatures. Table 1 indicates the percentages of ash resulting from ignition of different food substances at various temperatures.

Even ignition at the higher temperatures failed to remove the whole of the elemental carbon, whiteness of the ash being no guide in this respect. This persistence of unoxidised carbon and the unavoidable decomposition of carbonates make the ash figure necessarily arbitrary, so that strict adherence to standard conditions is essential for reproducible results.

Chromatographic Analysis

Attempts to apply chromatographic analysis and the polarograph to food analysis are still in the development stage. The present scope of the latter has been defined[3] as (*a*) sorting tests where a rapid control method is desired, and (*b*) analysis of organic mixtures

TABLE 1.

Temperature °C.	*Barley.*	*Oats.*	*Wheat.*	*Soy Bean.*	*Peas.*	*Herring.*
500	2·50	4·08	1·99	5·81	3·08	11·39
550	2·51	3·06	1·77	5·50	2·99	10·59
600	2.49	3·95	1·73	5·38	2·93	10·38
650	2·52	3·93	1·72	5·19	2·90	10·20
700	2·52	3·91	1·74	5·00	2·84	10·11

available in relatively small quantities not readily separable by chemical methods and where a high degree of accuracy is not required. A simple apparatus is described in connection with this work. A modification in the application of absorption analysis to solutions containing a mixture of components is obtained by causing the boundary between a solution and the pure solvent, in a vertical column containing powdered absorbent, to rise by running in solution from the base of the column.[4] The boundary remains sharp, and is more or less retarded compared with the surface of the pure solvent. The "retardation volume" is characteristic of the solute. With a mixture containing several components a number of boundaries equal to the number of solvents is obtained. These may be observed by suitable means, and in this manner a solution containing 1 per cent. each of salt, dextrose and phenol was successfully analysed.

Carbon Dioxide

The determination of carbon dioxide by steam distillation into alkali solution is described at great length by Shaw and McIntire.[5] Included is the description of an interesting investigation of the titration of carbonate and bicarbonate mixtures of barium and sodium. This was, of course, undertaken in order to obtain a correct estimation of the evolved CO_2. The method is actually developed for the determination of carbonates in soil, but should be readily adaptable to the examination of self-raising flours, baking powder, etc.

A **new indicator** with a colour range (red, alkaline—white, acid) between *p*H 12 and 13, a small salt error and practically no alcohol error is claimed as having remarkable properties[6] (5-pyridinium-glutaconedialdehyde perchlorate).

Workers who use the **glass electrode** for *p*H determination must often wonder what degree of reliance can be placed on their readings. A study of this question, involving the collaboration of several experimenters,[7] has led to the not unexpected conclusion that good reproducibility is obtained with well buffered solutions but not with poorly buffered solutions.

Dairy Produce

The significance of the **freezing-point depression** of abnormal, watered and preserved milk samples has been the subject of several critical discussions. Scott Dodd and Cowan[8] have studied the differentiation between milk with low solids-not-fat, due on the one hand to abnormality and on the other to watering. In the former case there is a tendency for the osmotic pressure (and hence the freezing-point depression) to be maintained by an increase in ash constituents. In exceptional cases the ash may constitute even up to 15 per cent. of the total solids-not-fat instead of the normal 8·3 per cent. The result is that the Hortvet freezing-point depression is very constant, never falling appreciably below 0·530° C.

Sour milk and abnormal herds are also discussed in this paper. That this constancy of Δ ° C. does not apply to "milk" from cows with clinical mastitis is shown by Rowland, Aschaffenburg and Vinoglou.[9] Such a fluid is, of course, not milk in the accepted sense. They agree, however, that sub-clinical mastitis does not cause appreciable depression. A low value of Δ ° C. is therefore agreed to be a definite indication of watering. Sub-clinical mastitis does, however, cause a significantly greater difference in the Δ ° C. of milk from the different quarters of the cow's udder, a fact which may be of some significance in the case of an "appeal to the cow".

The freezing point of milk preserved with formaldehyde should be corrected by −0·009° C. per 100 p.p.m. of formaldehyde.[10] The corrected figure agrees within ±0·005° C. with that of the unpreserved milk, quite close enough for examination for added water. Storage of milk with more than 1,000 p.p.m. of formaldehyde causes some combination with protein, but the remaining free formaldehyde, which may be estimated, remains a satisfactory basis for applying the correction.

A convenient method for **determining formaldehyde** involves its reduction by sodium sulphite in alkaline solution, using the fat-protein-free filtrate for this purpose. The Δ ° C. of milk from which the formaldehyde has been removed by distillation, after adding an equal volume of water, is not as reliable as that obtainable by use of the above correction.

Some difficulty in applying **the phosphatase test** for efficient pasteurisation of milk has been experienced in the United States from the activity of a thermophilic organism of genus lactobacillus which survives pasteurisation and is capable of producing phosphatase in correctly processed milk.[11] Where the organism is suspected of causing a false positive test, repasteurisation will indicate its presence. The false phosphatase due to this thermophile is scarcely affected by such treatment.[12]

The phosphatase test is the subject of a pamphlet issued by the Ministry of Health.[13] This describes recommended procedure for carrying out the test. The following possible sources of error are mentioned: interfering chemicals from the neighbourhood, bottle caps, etc., of phenolic resin, saliva, dirty apparatus, effect of light on reagents and test. Milk is classified into three grades according to the Lovibond blue units produced: 0 to 2·3, sufficiently pasteurised; 2·4 to 6·0, insufficient temperature or holding time or alternatively slight contamination with raw milk; 6·0 and over, grossly undertreated or contaminated with raw milk.

The application of **the resazurin test** in artificial light is studied by Davis and Newland.[14] Several different sources of light were included in the experiments, and it is concluded that low-pressure mercury fluorescent tubes are suitable in almost all cases and are restful for the eyes. Closer approximation to the daylight tests is obtained with a standard light source specified by the *Commission Internationale de l'Eclairage* (1931), but this lamp is more elaborate and is more tiring to use. In any case of dispute daylight must be regarded as standard.

Two methods for the determination of **protein in milk** have been described. One entails conversion of the protein to ammonium salts by a micro-Kjeldahl digestion and a final examination based on the reaction of sodium hypobromite with ammonia, excess of the former being determined iodometrically.[15] The other simple method for casein involves precipitation with acetic acid, washing and re-solution in sodium salicylate solution. Titration with N/50 NaOH gives a figure for casein which is, however, 0·01 to 0·1 per cent. higher than that obtained by nitrogen determination.[16]

Correlation of the **quality of dried egg** with its analytical characteristics has proceeded far enough for

a fairly comprehensive description of methods of assessing quality to be published.[17] For distribution in this country greatest emphasis has in the past been placed on flavour as a criterion of quality, a policy which is no doubt fully justified. Further criteria now proposed from a Canadian source are bacterial count, moisture content and either the fluorescence measurement or the potassium chloride value. The last test is an estimation of the coagulable protein. As regards fluorescence, an increase in this indicates reduction in quality.

Salt may be determined in egg products by the "open Carius method"—*i.e.*, digestion with potassium permanganate and nitric acid on a water bath in the presence of excess silver nitrate, which is finally back-titrated with thiocyanate.[18]

The extraction of fat from egg products involves a differentiation between "free" and "bound" fat. To obtain the latter, digestion with hydrochloric acid is necessary. Correction for the lecithin present is made by estimation of phosphorus.[19]

Meat and Fish

Rapid **determination of salt** in the presence of protein is effected by extracting the minced sample with an acetate buffer of *p*H 4·5 and titrating direct with 0·0856 N silver nitrate solution, using dichlorofluorescein as an adsorption indicator.[20] It is proved that salt is completely extracted from the sample and that silver is not absorbed by the protein present at this *p*H. The distribution of salt in cured hams may be determined by a method of careful dissection.[21] Muscle segments are cut away from adhering fat and connective tissue, and the salt determined in the usual way. The salt contents of different muscles vary widely—*e.g.*, in the same cross-section of a 30 days brine-cured ham, from 2·3 per cent. to 21·6 per cent. This variation makes it necessary to include as many muscles as possible in the examination.

Sugars and Starches

Some methods for the **analysis of starch hydrolysates**—*e.g.*, commercial glucose syrup—have been based upon the assumption that the whole of the reducing power is contributed by the maltose and dextrose present. On this assumption, and with a knowledge of the specific rotations of the maltose, dextrose and dextrin, figures for these three constituents may be calculated from the reducing power, the specific rotation and the total solids of the mixture. That this is not justifiable, however, is proved in a recent comparison of biological and chemical determinations of the reducing power of starch hydrolysates.[22] The chemical methods used were based on Barfoed's copper acetate solution for dextrose and Fehling's solution for maltose plus dextrose; the biological methods depending on the use of two different strains of yeast which attack respectively all sugars and all sugars except maltose, the carbon dioxide evolved being estimated volumetrically. Dextrose figures by the two methods agree well, but the "chemical" figure for apparent maltose is considerably higher than the "biological" figure. This is presumably due to some of the dextrins present having a reducing power to Fehling's solution but not being attacked by the yeast. The biological determination is therefore to be preferred when the true maltose content of starch hydrolysates is required.

The presence of either **lactose** or **maltose** in solution may be detected qualitatively by a test described by Feason.[23] The test is based on reaction with methylamine hydrochloride. On rendering alkaline after the reaction maltose or lactose is indicated by the slow appearance of a carmine colour.

Jackson and McDonald[24] have carried out a comparison of Herzfeld's (A.O.A.C. Official) method for the **determination of invert sugar** in refined sugar with Ofner's method (the official Czecho-Slovak method) and greatly prefer the latter. The milder alkali used, a buffered solution of sodium carbonate, Rochelle salt and sodium phosphate, results in a much smaller oxidising effect on sucrose than the Fehling's solution employed by Herzfeld.

Levulose may be estimated in the presence of aldose sugars by first oxidising the latter with alkaline iodite and then determining the levulose, which survives this treatment, with an alkaline copper reagent, the reduced cuprous oxide being estimated in one of several ways. A discrepancy between the use of potassium permanganate and ceric sulphate for the last purpose is due to the former reagent oxidising some impurity associated with the presence of the iodite. The ceric sulphate figure is the correct one.[25]

In cases where the removal of lead is necessary after the use of lead acetate as a clarifying agent in the analysis of crude sugar solution, potassium chromate may be preferred to phosphate, carbonate or oxalate as a deleading agent.[26]

A new method for the determination of **amylose** and **amylopectin** in starches is based on the differing iodine-combining capacities of these two fractions. The reaction has been studied in detail, and gives results in close agreement with the butanol fractionation method.[27]

The degree of **cooking of cereal products** may be estimated by determining the consumption of alkali by the starch present in the cereal when heated under specified conditions with mild alkali.[28] The result is expressed as the alkali number (c.c. of N/10 NaOH consumed by 1 gm.). For all truly uncooked materials this is below 17.

Fruit and Vegetable Products

In view of the increasing importance of **dehydrated vegetables** as an item of diet, particularly in the Services, interest attaches to a critical examination of the **peroxidase test** for efficient blanching.[29] It is concluded that the results of this test, which of course depends on the survival of peroxidase in insufficiently blanched material, require very careful interpretation. The first requirement is the selection of an oxidation indicator. All those tested were more or less oxidised by hydrogen peroxide alone or in the presence of metallic catalysts, so that the appearance of colour is not an absolute indication of the presence of the peroxidase system. Benzidrine is the least reliable in this respect and even guaiacol, the selected indicator, is not perfect. Another difficulty is that ability to oxidise the indicator in the presence of hydrogen peroxide may persist, even after satisfactory blanching in those parts of the vegetable which were most metabolically active, particularly if physiological damage had occurred. An example is the eyes of a potato. For this reason characteristic local spots and veins of colour may occur which are no indication of insufficient processing.

TABLE 2.

Kind of Juice.	*Ash.*			*Alkalinity of Ash.*			*Phosphorus Pentoxide.*		
	Max.	*Min.*	*Av.*	*Max.*	*Min.*	*Av.*	*Max.*	*Min.*	*Av.*
Lemon : natural	0·48	0·31	0·40	6·0	3·7	4·9	0·042	0·020	0·027
concentrated ...	0·37	0·29	0·34	5·3	3·5	4·1	0·038	0·019	0·026
Lime : natural	0·44	0·33	0·38	5·4	3·9	4·6	0·030	0·019	0·025
Orange : natural ...	0·63	0·39	0·50	7·7	4·6	5·9	0·052	0·028	0·038
concentrated ...	0·59	0·35	0·45	6·1	3·8	4·7	0·057	0·033	0·043
Grape fruit : natural ...	0·56	0·34	0·46	5·7	3·7	4·2	0·043	0·028	0·033

Useful data for the estimation of the **fruit juice content of beverages** containing citrus juices are provided in a paper by Stern.[20] Figures are given for lemon, orange, grapefruit and lime juices of various origins, both at natural strength and concentrated, calculated back to natural strength. The effects of preservatives and sweeteners added as their alkali salts on the analytical figures are discussed. The examples in Table 2 give an idea of the natural variations occurring in these juices and indicate the degree of accuracy which can be expected from any estimate of juice content.

A scheme for the analysis of **fruit products** in order to discover the types of fruit used and the relative quantities in which they are present is described in the *J.A.O.A.C.*[21] It is based upon the fact that different fruits contain different acids and involves the individual determination of tartaric, citric, malic (lævo- and racemic), and isocitric acids. The whole procedure is very tedious, and appears to offer few, if any, advantages over the lead salt method which has been in use for some years in this country.[22]

Modifications proposed for another A.O.A.C. method—that for estimating the **sugar in apple tissue**—have as their object to save time where a large number of samples have to be analysed.[23] Although the proposals are not particularly original, the full details given will be of value to any chemist faced with a similar problem. Similar considerations have led to proposals for a modified chloroplatinate method for determining potassium in fruit products.[24, 25]

Sampling of **frozen pack fruit** in barrels is not easy. A simple kit specially designed for this purpose which should be useful consists of a trier—a steel tube with a saw cutting edge—and a number of barrel bungs.[66]

For determining the **moisture content of dried fruits** and vegetables the Dean and Stark method, using a petrol fraction b.p. 105° to 110° C., is preferred to oven methods, giving a more definite end point.[26] Dry fruit should be divided into small uniform pellets. Other material should be finely divided, if possible to pass a 30-mesh sieve.

When it is desired to estimate the residues from **insecticidal sprays** on fruits or vegetables it is an obvious advantage if these can be stripped by suitable solvents, so avoiding the necessity for digesting the main bulk of material. A solvent suggested for copper-containing residues is an aqueous solution of 5 per cent. ammonium nitrate and 5 per cent. nitric acid.[59] Others are, for nicotine, 0·5 per cent. sodium hydroxide solution; phenothiazine, 95 per cent. ethyl alcohol; and lead arsenate with lime or bordeaux, the same as for copper residues.

REFERENCES

1 St. John, *J.A.O.A.C.*, 1942, **25**, 857.
2 St. John, *ibid.*, 1942, **25**, 969.
3 Reznek, *ibid.*, 1942, **25**, 819.
4 Tiselius, *Arkiv. Kemi, Min. Geol.*, 1941, **14B**, No. 2, 25; *Brit. Chem. Abs.*, 1943, **A.I**, 136.
5 Shaw and McIntire, *J.A.O.A.C.*, 1943, **26**, 357.
6 Schwarzenbach, *Helv. Chim. Acta*, 1943, **26**, 418; *Analyst*, 1943, **68**, 227.
7 Bonnar, *J.A.O.A.C.*, 1942, **25**, 969.
8 Scott Dodd and Cowan, *Analyst*, 1943, **68**, 46.
9 Rowland, Aschaffenburg and Vienoglou, *Analyst*, 1943, **68**, 302.
10 Macdonald, *Analyst*, 1943, **68**, 171.
11 Buck, *Am. J. Pub. Health*, 1942, **32**, 1224; *C.A.*, 1943, **37**, 689.
12 Kaplan, *J.A.O.A.C.*, 1943, **26**, 259.
13 "The Phosphatase Test for Treated Milk", *Ministry of Health Pamphlet*, 1943.
14 Davis and Newland, *Dairy Inds.*, 1943, **8**, 555.
15 Ling, *J.S.C.I.*, 1942, **61**, 194.
16 Gorbacheva, *Molochnaya Prom.*, 1940, **7**, No. 6, 10; *C.A.*, 1942, **36**, 6681.
17 Thistle, Pearce and Gibbons, *Can. J. Res.*, 1943, **D. 21**, 1; *Food Ind.*, 1943, **15**, No. 8, 127.
18 Mitchell, *J.A.O.A.C.*, 1943, **26**, 352.
19 Crossfeld, *Z. Untersuch. Lebensm.*, 1942, **83**, 322; *C.A.*, 1943, **37**, 4147.
20 Dyer, *Ind. Eng. Chem.* (*anal.*), 1943, **15**, 439.
21 Besley and Carrol, *J. Agric. Res.*, 1942, **64**, 293.
22 Schultz, Fisher, Atkin and Frey, *Ind. Eng. Chem.* (*anal.*), 1943, **15**, 496.
23 Fearon, *Analyst*, 1942, **67**, 130.
24 Jackson and McDonald, *J.A.O.A.C.*, 1943, **26**, 462.
25 Sullivan, *J.A.O.A.C.*, 1943, **26**, 428.
26 Ramanayya and Rao, *Current Sci.*, 1942, **11**, 399. *Brit. Chem. Abs.*, 1943, **BIII**, 125.
27 Bates, French and Rundle, *J. Amer. Chem. Soc.*, 1943, **65**, 142; *Analyst*, 1943, **68**, 192.
28 Benham, *Cereal Chem.*, 1942, **19**, 597; *Analyst*, 1943, **68**, 83.
29 Pfaff and Joslyn, *Food Ind.*, 1943, **15**, No. 3, 50.
30 Stern, *Analyst*, 1943, **68**, 44.
31 Hartmann, *J.A.O.A.C.*, 1943, **26**, 444.
32 Hinton and Macara, *Analyst*, 1940, **65**, 540.
33 Leonard, Meade and Dustman, *Ind. Eng. Chem.* (*anal.*), 1943, **15**, 579.
34 Wood, *J.A.O.A.C.*, 1943, **26**, 472.
35 Osborn, *J.A.O.A.C.*, 1943, **26**, 324.
36 Churchward, *Aus. Chem. Inst. J. and Proc.*, 1943, **10**, 69; *C.A.*, 1943, **37**, 4143.

(To be continued)

The Vitamins

PROGRESS IN 1943

F. A. ROBINSON, M. Sc. Tech., F.I.C.
Glaxo Laboratories Ltd.

IN THE SURVEY[1] which appeared about a year ago it was pointed out that a large proportion of the publications for 1941-42 relating to vitamins dealt with their application in nutrition and medicine, and only a comparatively small number with the properties of vitamins themselves. This tendency is even more marked in the literature published during 1943.

Nutritional Surveys

Several papers have appeared on the nutritional requirements of specified groups such as schoolboys,[2] students,[3] and internees,[4] while investigations have also been made into the effect of vitamin supplements on physical fitness. In one experiment[5] the administration of supplements of vitamins A, C and D to a group of cadets reduced the incidence of minor respiratory and gastro-intestinal complaints and increased the vital activity and endurance times. In another experiment,[6] however, the addition of 0·23 mg. of aneurine per 1,000 Calories had no beneficial effect on physical activity. An investigation recently reported[7] appears to indicate that the administration of vitamins A, B_1, C and D with riboflavin and nicotinic acid has no effect on the common cold, the number of colds in the treated group being as great as in a similar group receiving a simple placebo.

Food tables, useful in dietary surveys, have been published[8] and a simplified method of calculating the nutritional value of diets has been devised,[9] in which all the common foods are classified into groups with similar nutritive contents, special dietary functions or special food value.

The minimum daily requirements of aneurine and riboflavin are stated[10] to be 0·45 and 0·5 mg. per 1,000 Calories respectively. An examination of the vitamin B content of a well-balanced diet containing 2,500 Calories showed[11] that the daily intakes were: aneurine, 3·6; nicotinic acid, 40; riboflavin, 3·7; pantothenic acid, 11·2; biotin, 0·25; inositol, 08·7; pyridoxine, 1·8; and folic acid, 1·4 mg. An average American diet, on the other hand, was found[12] to contain appreciably less, the values being: riboflavin, 1·4; nicotinic acid, 11; and pantothenic acid, 4·9 mg. per 2,500 Calories, whilst a similar diet with fortified bread and flour contained 1·6 mg. of riboflavin and 17 mg. of nicotinic acid per 2,500 Calories.

Estimation of Vitamins

Increased attention was paid during 1943 to effecting refinements in the methods of estimating vitamins in foodstuffs and biological preparations. Improved micro-biological assay methods for nicotinic acid,[13] aneurine,[14] *p*-aminobenzoic acid,[15] riboflavin[16] and pyridoxine[17] have been described. A biological assay of crystalline aneurine monohydrate by the rat-growth method showed[18] that one I.U. = 3·172μg. Comparisons have been made[19] between the different chemical and biological methods now available for estimating aneurine; these show that the azo and thiochrome methods give equally good results.

Microanalytical methods for estimating vitamin A have been described,[20] and a method of separating vitamin A from xanthophyll by adsorption on a column of bone-meal and sand, followed by elution with petroleum ether has been used[21] to facilitate the estimation of vitamin A in egg-yolk. A careful examination[22] of the potency of the U.S.P. reference oil showed that the true factor for converting values of $E^{1\%}_{1\,cm}$ into international units is 1740, and it is recommended that this value be adopted generally. There is, however, at present no machinery available for effecting this change, and the official factor of 1600 still holds.

A modified antimony chloride reagent for estimating vitamin D has been described,[23] and an improved method[24] of estimating vitamin D by means of this reagent in fish-liver oils. A modified biological method of estimating vitamin D_3 has also been worked out,[25] using chicks.

A new colour reaction[26] for ascorbic acid may prove to be of value for its detection and possibly estimation; it consists in the formation of a violet colour on oxidation with *o*-dinitrobenzene.

Vitamin Content of Foodstuffs

The efforts to improve vitamin assays have been accompanied, as might have been expected, by additional estimations of the vitamin contents of foodstuffs, and assay figures have been published for nicotinic acid, pantothenic acid and pyridoxine in wheat;[27] nicotinic acid in meat;[28] nicotinic acid,[29] ascorbic acid[29] and vitamin P[31] in miscellaneous fruits and vegetables; ascorbic acid in rose hips[32] and oranges;[33] aneurine in potatoes;[34] and vitamins A and D in herring.[35] Cheese appears[36] to be a good source of riboflavin, pantothenic acid, nicotinic acid and biotin, the quantity of each vitamin, with the exception of riboflavin, increasing on ripening.

The stories that explorers stranded in the Arctic may be poisoned by eating bear and seal liver have now received a very unexpected explanation. It has been shown[37] that these organs contain relatively large amounts of vitamin A—namely, 13,000 and 18,000 I.U. per gram—and that the consumption of large amounts by experimental animals leads to marked hypervitaminosis.

New Vitamins

Little new information concerning the structure of any of the newer vitamins has been disclosed during 1943, though a paper on the chemical nature of

vitamin P has been published,[38] in which it is stated that hesperidin, limonin, eriodictyol and eriodictyol glucoside have no effect on blood pressure or capillary fragility, but that a water-soluble yellow pigment, probably hesperidin chalkone, brings about a marked reduction in blood pressure. It is suggested that vitamin P is a chalkone and not a flavanone, but the evidence for this suggestion is by no means conclusive and, as work is being actively pursued to test the claim, judgment must be suspended for the time being.

Claims to have characterised several new factors essential for animals or micro-organisms have recently been made. Elvehjem and his colleagues[39] describe vitamin B_{10} as a factor necessary for the proper development of feathers in chicks, and vitamin B_{11} as essential for the growth of chicks. Both are soluble in water and adsorbed at *p*H 3 on norit and super-filtrol, from which they are eluted by aqueous alcoholic ammonia. They are said to be different from all the known vitamins, including folic acid; a partial separation of the two factors was obtained by fractional precipitation with alcohol. Hogan and his colleagues[40] have announced the isolation of a crystalline water-soluble factor necessary for the growth of chicks. Although adsorbed by charcoal, it is said to be different from xanthopterin and from the anti-pernicious anæmia factor. The new factor has been provisionally named vitamin B_c and has the formula $C_7H_{10}N_5O_2$.

Stokstad[41] has also reported the isolation of a crystalline factor from liver and yeast which gives an analysis close to that of Hogan's vitamin B_c. He observed a difference between the activity towards different micro-organisms of the factor obtained from yeast and that obtained from liver; this may indicate that the two are not identical.

Vitamin A_2

Two groups of workers[42] have announced the preparation from pike-liver oil of vitamin A_2 free from vitamin A_1. The substance is said by one group to possess strong vitamin A activity, and by the other group to be inactive.

Vitamin D

The preparation of another pro-vitamin D has been announced.[43] This is 7-dehydro-campestrol, which, on irradiation, produced a resin containing 4 million I.U. per gram. An attempt to elucidate the mechanism of the action of vitamin D by means of radioactive phosphorus appeared to indicate[44] that the therapeutic effect of this vitamin is due to an increase in the phosphorus metabolism in the bone.

The chemical and biological stabilities of crystalline vitamins D_2 and D_3 have been reported on.[45]

Vitamin K

A claim that vitamin K and its analogues owe their anti-hæmorrhagic action to an oxidative biodecomposition to phthalic acid has been made,[46] diethyl phthalate being shown to be highly anti-hæmorrhagic.

Biological Rôle of Vitamin B_2 Complex

A good deal of evidence confirming the importance of the vitamin B_2 complex in maintaining health has now accumulated, and a curious story of the way in which these substances exert their effect is gradually being unfolded, though the details of the mechanism are still far from clear. The story is also linked up, rather unexpectedly, with sulphonamides and hyperthyroidism.

It has been shown[47] that calcium pantothenate but not *p*-aminobenzoic acid cures or prevents grey hair in rats resulting from a deficient diet, and it has also been shown[48] that administration of certain sulphonamides, particularly sulphaguanidine and succinyl sulphathiazole, produces grey hair, loss of weight and other symptoms which can be alleviated by administration of biotin and folic acid. It is therefore concluded that some of the members of the vitamin B_2 complex stimulate the growth of intestinal bacteria, which in turn synthesise known and unknown factors essential for the well-being of the animal. The sulphonamides, by inhibiting the growth of these organisms, bring about a deficiency of these essential factors.

In the course of experiments designed to ascertain whether there was such a relationship between the sulphonamides and the vitamin B_2 complex, it was incidentally observed[49] that the thyroids of the experimental animals became enlarged and hyperæmic. This observation recently led to the use of other substances capable of producing thyroid enlargement for the treatment of hyperthyroidism; of these, thiouracil has already shown considerable promise.

Conclusion

In general, it is dangerous to attempt to forecast future developments, but it is not being over-bold to hazard a guess that the next twelve months will see important advances in our understanding of the part played by members of the vitamin B_2 group in the animal economy, and it seems equally likely that the constitution of some of these elusive substances will also be worked out in the near future. At the present time this group of vitamins holds the centre of the stage and is the subject of intensive investigations in many laboratories.

REFERENCES

1. F. A. Robinson, *Food Manufacture*, 1943, 123.
2. E. M. Widdowson and R. A. McCance, *Lancet*, 1942, **243**, 689; D. C. Wilson, *ibid.*, 692; L. J. Harris and M. Olliver, *ibid.*, 1943, **244**, 454.
3. A. P. Brown, M. L. Fincke, J. E. Richardson, E. N. Todhunter and E. Woods, *J. Nutrition*, 1943, **25**, 411.
4. R. E. Flowerdew and O. B. Bode, *Lancet*, 1943, **244**, 428.
5. A. A. Harper, I. F. S. Mackay, H. S. Raper and G. L. Camm, *Brit. Med. J.*, 1943, **1**, 243.
6. A. Keys, A. F. Henschel, O. Michelsen and J. M. Brozek, *J Nutrition*, 1943, **26**, 399.
7. D. W. Cowan, H. S. Diehl and A. B. Baker, *J. Amer. Med. Assoc.*, 1942, **120**, 1268.
8. E. M. Widdowson and R. A. McCance, *Lancet*, 1943, **244**, 230.
9. G. H. Berryman and C. Chatfield, *J. Nutrition*, 1943, **25**, 23.
10. R. D. Williams, H. L. Mason and R. M. Wilder, *ibid.*, 71; R. D. Williams, H. L. Mason, P. L. Cusick and R. M. Wilder, *ibid.*, 361.
11. R. J. Williams, *J. Amer. Med. Assoc.*, 1942, **119**, 1.
12. V. H. Cheldelin and R. R. Williams, *J. Nutrition*, 1943, **26**, 417.

[13] R. D. Greene, A. Black and F. O. Howland, *Ind. Eng. Chem., Anal. Ed.*, 1943, **15**, 77; W. A. Krehl, F. M. Strong and C. A. Elvehjem, *ibid.*, 471; L. Atkin, A. S. Schultz, W. L. Williams and C. N. Frey, *J. Amer. Chem. Soc.*, 1943, **65**, 992.
[14] E. S. Josephson and R. S. Harris, *Ind. Eng. Chem., Anal. Ed.*, 1942, **14**, 755.
[15] H. K. Mitchell, E. R. Isbell and R. C. Thompson, *J. Biol. Chem.*, 1943, **147**, 485; R. C. Thompson, E. R. Isbell and H. K. Mitchell, *ibid.*, **148**, 281.
[16] F. M. Strong and L. E. Carpenter, *Ind. Eng. Chem., Anal. Ed.*, 1942, **14**, 909; F. W. Chattaway, F. C. Happold and M. Sandford, *Biochem. J.*, 1943, **37**, 298; B. D. Greene and A. Black, *J. Amer. Pharm. Assoc.*, 1943, **32**, 217.
[17] L. Atkin, A. S. Schultz, W. L. Williams and C. N. Frey, *Ind. Eng. Chem., Anal. Ed.*, 1943, **15**, 141.
[18] A. E. G. Shrimpton, *Quart. J. Pharm.*, 1943, **16**, 86.
[19] R. A. Peters, H. Chick, K. H. Coward, L. J. Harris, B. S. Platt and T. F. Macrae, *Biochem. J.*, 1943, **37**, 433; B. S. Platt and G. E. Glock, *ibid.*, 439; R. A. Brown, E. Hartzler, G. Peacock and A. D. Emmett, *Ind. Eng. Chem., Anal. Ed.*, 1943, **15**, 494.
[20] F. Urban, B. Milder and C. Carruthers, *Biochem. J.*, 1943, **37**, 295; H. Hoch, *ibid.*, 425.
[21] T. B. Mann, *Analyst*, 1943, **68**, 233.
[22] E. M. Hume, *Nature*, 1943, **151**, 535.
[23] A. Zimmerli, C. H. Nield and W. C. Russell, *J. Biol. Chem.*, 1943, **148**, 245.
[24] D. T. Ewing, G. V. Kingsley, R. A. Brown and A. D. Emmett, *Ind. Eng. Chem., Anal. Ed.*, 1943, **15**, 301.
[25] J. I. M. Jones and J. F. Elliott, *Biochem. J.*, 1943, **37**, 209.
[26] W. R. Fearon and E. Kawerau, *Biochem. J.*, 1943, **37**, 328.
[27] L. J. Teply, F. M. Strong and C. A. Elvehjem, *J. Nutrition*, 1942, **24**, 167; E. C. Barton-Wright and R. G. Booth, *Biochem. J.*, 1943, **37**, 25.
[28] W. J. Dann and R. Handler, *J. Nutrition*, 1942, **24**, 153.
[29] W. C. Russell, M. W. Taylor and J. F. Beuk, *J. Nutrition*, 1943, **25**, 275.
[30] M. Olliver, *Chem. and Ind.*, 1943, 146.
[31] A. L. Bacharach and M. E. Coates, *J. Soc. Chem. Ind.*, 1943, **62**, 85.
[32] F. Wokes, E. H. Johnson, J. G. Organ and F. C. Jacoby, *Nature*, 1943, **151**, 279.
[33] A. D. Holmes, J. A. Patch and F. Tripp, *New Eng. J. Med.*, 1943, **228**, 8.
[34] J. Meiklejohn, *Biochem. J.*, 1943, **37**, 349.
[35] A. L. Bacharach, E. M. Cruickshank, K. M. Henry, K. Kon, J. A. Lovern, T. Moore and R. A. Morton, *Brit. Med. J.*, 1942, **2**, 691.
[36] R. A. Sullivan, E. Bloom and J. Jarmol, *J. Nutrition*, 1943, **25**, 463.
[37] K. Rodahl and T. Moore, *Biochem. J.*, 1943, **37**, 166.
[38] R. H. Higby, *J. Amer. Pharm. Assoc.*, 1943, **32**, 74.
[39] G. M. Briggs, T. D. Luckey, C. A. Elvehjem and E. B. Hart, *J. Biol. Chem.*, 1943, **148**, 163.
[40] L. R. Richardson, A. G. Hogan and R. J. Karrasch, *J. Nutrition*, 1942, **24**, 65; B. L. O'Dell and A. G. Hogan, *J. Biol. Chem.*, 1943, **149**, 323.
[41] E. L. R. Stokstad, *ibid.*, 573.
[42] P. Karrer and E. Britscher, *Helv. Chim. Acta*, 1942, **25**, 1650; J. L. Jensen, E. M. Shantz, N. D. Embree, J. D. Cawley and P. L. Harris, *J. Biol. Chem.*, 1943, **149**, 473.
[43] W. L. Ruigh, *J. Amer. Chem. Soc.*, 1942, **64**, 1900.
[44] N. Shimotori and A. F. Morgan, *J. Biol. Chem.*, 1943, **147**, 201.
[45] W. Huber and O. W. Barlow, *ibid.*, **149**, 125.
[46] M. M. Shemiakin, L. A. Schukina and J. B. Shvezov, *Nature*, 1943, **151**, 586.
[47] L. M. Henderson, J. M. McIntyre, H. A. Waisman and C. A. Elvehjem, *J. Nutrition*, 1942, **23**, 47.
[48] G. J. Martin, *Proc. Soc. Exp. Biol. Med.*, 1942, **51**, 353; A. D. Welch and L. D. Wright, *J. Nutrition*, 1943, **25**, 555; E. Nielsen and C. A. Elvehjem, *J. Biol. Chem.*, 1942, **145**, 713; H. A. Waisman and C. A. Elvehjem, *J. Nutrition*, 1943, **26**, 361.
[49] J. B. Mackenzie, C. G. Mackenzie and E. V. McCollum, *Science*, 1941, **94**, 518.

Society of Agricultural Bacteriologists

THE annual conference of the Society of Agricultural Bacteriologists was held at Leeds last autumn. The majority of the papers read were concerned with problems associated with the dairy industry, but several other aspects of bacteriology were represented.

The chlorination of sewage and sewage effluents, a practice which may be desirable in special cases of sewage disposal, was the subject of a paper which described the principle involved and gave the results of experiments showing the effect of chlorination on the bacterial population.

A paper on the *Bacillus subtilis* group in relation to industrial products dealt with the activities of *B. subtilis* (an organism which is frequently identified as *B. mesentericus* or *B. vulgatus*) and of *B. licheniformis* in dairy products, canned foods, bread, sugar juices and other materials. Factors determining the occurrence of the organisms and controlling their growth were described.

Another contribution concerned the bacteriology of potato silage and "slowness" in cheese-making, the effect of pasteurisation on the bacteria of raw milk. Problems incidental to the condensing and drying of milk were discussed, among a number of other matters of interest to the dairy industry.

A contribution dealing with the bacteriology of potato silage reported that no evidence could be obtained that any of the lactic acid bacteria survive the cooking of the potatoes. It appears that in practice the lactic acid fermentation, on which preservation depends, is due to accidental contamination. Excellent results have been secured by inoculating the cooked tubers with a combination of *Streptococcus lactis* and *Lactobacillus plantarum*.

BOOKS RECEIVED

World Trade Alliance. By Sir Edgar R. Jones, K.B.E.

World Trade Alliance. Explanatory pamphlet. By Trefor Lloyd-Williams.

A Policy for the Milk Industry. A Memorandum prepared by the Central Milk Distributive Committee.

Ergot and "Bloody" Bread

M. SCHOFIELD, M.A.

THE COMMENT made by the Minister of Food regarding the good health enjoyed by British people, despite the present restriction in quantity and quality of foods, recalls two equally remarkable examples in the past where Britain proved immune against diseases prevalent throughout the Continent. The first of these, of particular significance when consumption of rye is on the increase, was ergot of rye causing ergotism among its consumers; the second was a series of epidemics of the remarkable *Bacillus prodigiosus*, giving rise to " bloody bread ". Both of them afford interesting examples of organisms affecting foodstuffs under specific conditions of growth.

The Claviceps Fungus

Though there are several varieties of the Claviceps fungus attacking a number of " grasses ", the attraction of *Claviceps purpurea* towards rye is an important subject for study wherever this grain is used. Rye entered South Europe at the beginning of the Christian era and came to this country, to the rich East Anglian lands, with the Teuton invaders.

Though rye bread was in general use among the poor in the Middle Ages; though we hear in history of the Peasants' Risings of 1381 and demands for wheaten bread to replace rye, and of rye being imported (350 years ago, for example) from Germany and Poland in times of scarcity, rye has been the predominant cereal only on the Continent, the chief cereal in many cases in Central Europe from Holland to Austria and the Urals.

Whereas, for example, of the 50,000 acres grown in Yorkshire, Lancashire, Cheshire and Essex in 1925, probably a good proportion was ploughed in as manure, the rye-wheat ratio in pre-war Poland was as high as four to one, while Russia and Germany provided the greatest acreage. Rye was also a predominant cereal for centuries in France before wheat took first place, the barren Sologne area only suitable for rye cultivation being at one period prominent on the black list of ergotism epidemics.

Nature of Ergotism

Following in many cases the first appearance of " honeydew ", of that yellowish concentrated sugary solution protruding between the glumes of rye, comes ergot, a dark, horn-like growth on the ripe heads of rye containing the poisonous ergotoxin. It appears whenever conditions such as cold are suitable for its propagation. For example, a wet and cold summer of 1926 in the Sarapoul and Votyak regions in Russia extended the flowering period of rye which had been injured by night frosts, this resulting in 11,319 cases of ergotism throughout 1926 and 1927.

Ergot secretes the alkaloids ergotinine $C_{35}H_{39}O_6N_5$ discovered by Tanret in 1875; ergotoxine $C_{35}H_{41}O_6N_5$ by Barger and Carr in 1906; and the two isomeric compounds $C_{31}H_{35}O_5N_5$ called ergotamine and ergotaminine, which appeared in the Swiss patents of 1918 and 1919. Long ago ergot was introduced into medicine, the midwives of France, Italy and Germany in the eighteenth century using " poudre obstetricule " or *Pulvis ad partum*—" a thimbleful to hasten labour "—while it also appeared in the official medicine of the United States early in the nineteenth century.

The Gangrenous Type

When ergot growths are ground up with rye grain, or even when separation by sieving is used (a process removing only the larger sclerotia), two different types of ergotism appear among consumers. The first is the gangrenous form, the second a convulsive type. The gangrenous form begins with lassitude, with pains in the limbs, and may then be followed by inflamed burning pains. Hence came the name Ignis Sacer, *feu sacré*, or Fire of St. Anthony, the latter term coming from the saint whose relics were visited by victims in the twelfth century. Later the diseased parts may blacken, with the gangrenous part shrinking and even causing limbs to separate from the body.

Although there are claims to have traced ergotism among the ancients, there is some doubt whether ergotism was referred to. For example, Pliny's reference to Rubigalia, a feast to ward off the disease in corn, was probably an incident originating in rust. Similarly, Galen's " black wheat " cannot be fixed definitely, since it may have been either smut or ergotism. Then there was the " grave pestilence " referred to in Cæsar's Civil War, when at the Siege of Marseilles " poisonous " grain appeared. Lucretius made matters more complicated by referring to an *ignis sacer* which had no connection with ergotism.

Yet once the disease was identified there was no lack of examples to cause consternation. A.D. 945 saw a " plague of fire " near Paris, when limbs " burned " and consumed victims who crowded into the church of St. Mary. Recovery came to these, but only because the Duke Hugh fed them with sound grain (they relapsed on returning home to their original diet). At other places this rushing to church when smitten by St. Anthony's Fire was common, as was recovery of the victims when, so it was believed, they were shown relics of the saints like the bones of St. Martial, bishop of Limoges. On another occasion a " deadly burning " was seen as sign of divine wrath for breaking the truce of God in not restricting fighting to Mondays, Tuesdays and Wednesdays. Sufferers from the holy fire were provided for in several houses of the Order of St. Anthony. Professor Barger's map of the spread of ergotism includes many battles at Arras, Verdun, Cambrai and Soissons, but particularly was Sologne a centre for a whole series of outbreaks.

The Convulsive Type

The second type of ergot poisoning is followed by severe convulsions or fits, this type having, remarkably enough, a different geographical distribution from the first. Thus convulsive ergotism appeared in Germany and Bohemia, when bread from diseased rye caused what was at first thought to be scurvy. While a

second outbreak was reported in the sixteenth century and may have been caused by bad rye imported into Brabant from Prussia, the year 1581 marks the first certain record of convulsive ergotism, of " a new and unheard of disease " in a village in the Duchy of Luneburg. Here the symptoms were paralysis and convulsions of hands and feet, when the strongest man could not open the clenched fists. The cause of *Das Kromme*, as the spasms were called, was held to be a poisonous manna or dew attacking the ripening grain; the cure was " good fresh eggs and butter ". Duisburg, Hamburg, Rostock and many other places experienced outbreaks of the convulsive form of ergotism.

In France and Switzerland, on the other hand, the gangrenous type prevailed and was eventually attributed to " ergot " believed by Lang, a public medical officer of Lucerne, to be toxic only in certain years when attacked by honeydew from which rye inside the ear is protected.

Outbreaks in England

As a striking contrast only two cases of ergotism appeared in England. The first was in the little village of Wattisham in Suffolk in 1762, when the family of a poor labourer, John Downing, was attacked by the gangrenous form. Remarkably enough, the cause was not rye but an unsound lot of wheat sold cheaply by a farmer, this exceptional circumstance being the reason why Dr. Wollaston, the local surgeon, maintained that the disease could not be ergotism which only resulted from rye bread.

A second outbreak occurred in Manchester among some Jewish refugees from Central Europe in 1927. These had eaten bread of one part rye to four parts wheat, the rye being harvested after a wet summer and ground in a Yorkshire stone mill where screening may not have been carried out. Of the possible explanations of Britain's immunity, such as that rye was seldom eaten alone or was less heavily infected than Continental grain, or that at no time was it the sole cereal, Professor J. C. Drummond favours the latter idea, though admitting that no satisfactory explanation has yet been found.

"Bloody" Bread

A second series of " disturbances " which swept Europe but left Britain apparently unaffected was due to the curious *Bacillus prodigiosus*—called also the Miraculous Micro-organism—giving rise to " bloody bread ". The organism responsible is common in the soil, thrives on damp starchy foodstuffs, particularly when warm and slightly acid, and covers the entire surface with the brilliant red dyestuff secreted by it—a dye at one time thought to have commercial application until it proved to be unstable in light. Since the starch of bread when thus attacked undergoes diastasis and the liquid oozing therefrom is stained red, the idea of " bloody" bread is readily understood. *Bacillus prodigiosus* does not thrive and produce its blood-red pigment on alkaline foods, on materials maintained at higher temperatures (for example, 100° F.), nor does it thrive on very acid rye bread. A distinction must be made at the start between the blood red produced and a pink colour due to the mould *Oidium aurantiacum*, which caused consternation in the Paris bakeries and in Algiers a century ago, and which has occasionally imparted a salmon-pink tint to English bread. Scheurlen has told how this fact caused confusion, since *B. prodigiosus* attacks only the surface of damp starchy foods whereas Oidium mould penetrates to the interior. Moreover, this penetration applies to a heavy acid bread from rye which was known in Germany and in classical history, while the mould may leave the outside fairly normal in appearance.

Early Outbreaks

As early as B.C. 332 the first outbreak recorded in history of blood-red bread may have been due to Oidium thriving in the rye bread of Macedonian troops besieging Tyre. Since the loaves of the soldiers " when broken in twain, had a blood-like appearance ", the men were much concerned until their priest Aristander —" the most skilful of the soothsayers " as Diodorus Siculus called this predecessor of Goebbels—pointed out that since the bread was bloody only on the inside, this clearly signified trouble for those (*i.e.*, the Tyrians) *inside* the town. Later in history " the whole of Italy was stirred with civil strife through internal disturbances ", not because of the fall of a Mussolini, but owing to an attack of the Prodigiosus bacillus. " Among the Arretini when bread was broken at meals, blood flowed from the middle of the loaves as from bodily wounds " was the description of Paulus Orosius of an outbreak more conspicuous than with the milder Oidium mould. Outbreaks have occurred throughout the centuries since the dawn of the Christian era. Italy, France, Germany, Belgium and other European countries were affected, the outbreak as with St. Anthony's Fire being connected with religious beliefs in a curious way. When *B. prodigiosus* appeared with its blood-red trail in consecrated Communion wafers in churches, the consternation with such a " Transubstantiation " may well be imagined. In A.D. 1169, for example, at Alsen in Denmark, a priest while elevating the Host saw blood on it, showed it to the assistant priest, and forecast tribulation threatening the church. And since a fortnight later the army of Selini occupied the place and overthrew the churches, this did not help matters. At Augsburg in 1199 there was similar consternation when " blood " appeared on the wafers. In this case a woman, wishing to keep her specimen, put it in her mouth, took it home and covered it with wax. But she had qualms later and took it back, and the priest, on removing the wax, found the water had changed into " true flesh and blood "!

Steffenshagen, Beelitz, Bolsena, Berlin, Frankfurt, Padua, Paris, La Rochelle, Namur—the " miraculous " organism continued its course. The Bolsena episode inspired Raphael's well-known picture and the Feast of the Holy Blood; the Frankfurt " miracle ", when " blood " was seen on wafers stolen by a boy and sold to some Jews, brought a great massacre of Jews. All these incidents must undoubtedly have been caused by lack of cleanliness, by peasants, bakers, and grain and flour dealers failing to maintain hygienic conditions and thus allowing a bacillus, originally derived from the soil, to spread through starchy media especially during the hot summer months. Was it our cooler climate and not any claim to hygienic habits in the past which enabled " this sceptred isle " to be immune from such " invasions " suffered by other European countries?

The British Fishing Industry

FISH FLESH is a very perishable foodstuff at ordinary temperatures. The struggle waged against this factor is one that dominates the history of the development of the fishing industry. Before the industrial era fishing was prosecuted on a relatively small scale fairly close to the coasts. Any surplus to immediate requirements was preserved for future consumption on the seaboard or, later on, as a commodity for trade in centres of commerce, by salting, drying and smoking. Inland, fresh fish was mainly freshwater fish. Defoe in the 1720's remarked on the stinking fish transported from the coast by road.

Advent of Machinery

The advent of machinery introduced a number of new but interconnected elements. Population expanded rapidly as manufacturing towns sprang up. Communications improved as it became necessary to feed these new centres. At the same time larger fishing vessels began to be built, capable of going farther afield to catch the extra supplies that were required. After the Napoleonic wars the men of Brixham and Barking began to trawl the southern North sea, where, by the 1840's, they had discovered lucrative and prolific fishing-grounds, and in the course of the next few decades had settled at Yarmouth, Scarborough and Hull and later at Grimsby, North Shields and Aberdeen. Longer voyages to off-shore grounds necessitated some method of preserving the fish from deterioration.

Preserving Fish

In the early 1810's ice, stored from the winter, was being used by a London fishmonger, who was also M.P. for Dundee, for Tay and Dee salmon shipped by fast smacks to the capital. Yarmouth fish was brought by horse-van, using 48 horses in twelve changes. But the industrial revolution brought railways to the ports by the mid-1840's, and imported " natural " ice began to give way to that produced artificially and more cheaply by mechanical refrigeration by the 1860's. As a result of all these factors, fresh sea fish began to replace salt-preserved fish in inland towns by the 1850's.

Even greater vessels using a longer beam-trawl and better appliances resulted in further increased catching power. T. H. Huxley had thought that the quantities of fish destroyed by human agencies were insignificant compared with natural causes of death. But by the 1880's there had been a pronounced falling off in the catch, notably of flat-fish, in the North Sea, as evinced by a decreased catch per unit of fishing—that is, an increased effort was required to obtain a given weight of fish—while at the same time the average size of fish decreased. The struggle against this factor emerges in proportion as the struggle against perishability is successful.

Steam Trawlers

By the 1890's steam propulsion, facilitating trawlers with yet larger gear, hauled by steam winches, began to replace sailing smacks in which nets were hauled by hand capstan. These steam trawlers were capable of going still farther afield to discover virgin grounds, but, despite further increases in power and speed, the fish with which they returned was increasingly stale as distance of grounds from port increased. The limit was reached in the 1930's with cod brought from off Bear Island well above the Arctic Circle, six days' steaming-time from Hull. Prices dropped owing to the poor quality of much of the fish. The factor of perishability, in this case at ice temperatures, had again applied the brake. The fleets of specially built " twelve-knotters " were partially laid up to reduce the quantity landed, and the catch of the remainder restricted in an effort to improve quality by decreasing the average length of trip and permitting more careful treatment of the fish caught.

Superimposed on this technical impasse was the economic slump in the capitalist countries, with contracted purchasing power and phenomena associated with the approaching war situation, such as trade barriers and autarchy, spelt ruin for the herring industry that, with a declining home consumption, relied more than ever on exporting two-thirds of its catch, mostly salted, to Eastern Europe.

Such in outline is the historical context from which a recent book* emerges and some of the problems with which it deals. Written by one of the applied scientists employed before the outbreak of war at the Ministry of Agriculture and Fisheries Marine Biological Research Station, it first sympathetically examines various sections of the pre-war fishing industry. At one end of the distribution chain the fishmonger is putting his highly specialised knowledge at the service of the community. The usually hard-working wholesaler performs an essential function as a middleman in dealing with a highly perishable commodity with the speed and promptness that it requires. At the producing end, the inshore fisherman, still of more than historical interest despite his relative inefficiency, follows a hazardous occupation to land the finest of all fish, caught overnight, when weather permits.

A Game of Chance

The drifterman stakes expensive gear, damage to which may mean loss of livelihood, in what is still a game of chance with extremely localised shoals of herring, with export quotas to add to his difficulties. The Dogger Bank annually yields an ever-smaller weight of fish, despite evermore ruthlessly efficient methods. " Bobbins " of hard wood roll the lower lip of the trawl net over rocks on rougher ground than could previously be fished; the " otter-boards " that replaced the rigid beam for keeping the net open are now separated from the trawl by " bridles " of wire rope, to stir up the fish on either side of its path, which add particularly to the arduous labour of the trawlerman; the " tickler " chain stirs up the flat-fish in front of the trawl.

Once these technical innovations are adopted the catch increases for a while, but before very long falls away again to what it was before ever they were introduced, and return to earlier methods would now mean a much reduced catch. In the long-distance trawlers,

* *The Fish Gate.* By Michael Graham. London. 1943. 10s. 6d. net. Pp. 196 with 16 plates.

on which life would be intolerable, working 16 to 20 hours a day for three to four days on end, were it not for the long rests steaming to and from the grounds, restriction, with unemployment in its train, was the economists' palliative for maintenance of profitability.

The Biologist and Economic Problems

Dr. Graham gives a popular account of the history of his own science, indicating clearly the essentially utilitarian connection between the work of the marine biologist and the economic problems of the industry. He reviews briefly in non-technical language the scientific methods employed in the development of which he himself has played no inconsiderable part, leading up within quite recent years to the conclusive confirmation of the long-expressed conviction of practical fishermen that the seas are being overfished. With the assistance of diagrams that anyone would understand, he shows why it is that more intensive fishing leads to a decreased rate of catching, and, although at first an increased total yield results, a point is reached where, in fact, a reduced effort would yield a greater weight of fish, fewer in number, but of greater average size.

By application of this principle in 1930, even before it had its present sound scientific basis, the Pacific halibut fishery was restored to profitability, after having reached a state in which four times the effort was producing only a half of the 1907 catch. Joint and enlightened action by the United States and Canadian fishery administrations in arriving at the first international agreement of the sort resulted in the catch being stabilised at the 1930 level by five months' fishing instead of the nine formerly needed. This brings the author logically to the application of scientists' results to the fisheries of the North Sea and Eastern Atlantic, which also requires international agreement.

The wartime lull in fishing will have resulted in a marked increase in the stocks. After the last war the quest for immediate profit and the urgent need for food led to international competition in unbridled exploitation of the harvest of the seas.

However, once it had been conclusively shown that increase in the size of mesh would result in decreased destruction of immature fish, Britain decided unilaterally in 1933 to introduce new mesh regulations in accord with these findings, without waiting for international action. As a result of this powerful example, when a conference was called in 1936 representatives of other nations expressed considerable willingness to comply, and a convention in 1937 was ratified by most of the countries concerned. The author believes that this initiative should be repeated, with a view to agreeing upon a constant level of total fishing effort of all nations on the heavily fished grounds. New inventions resulting in reduced labour and expense would then, if intelligently exploited, have the effect of increasing profits and leisure. In the case of both the Arctic grounds and the herring fishery, international regulations and removal of trade barriers should result in a return to profitability here also, provided that the difficulties of preservation are overcome.

Combating Perishability

Once again, although the author does not point to the solution, the machine has to-day put man in a position to triumph over perishability by freezing—*i.e.*, lowering the fish to sub-icepoint temperatures—either on board the catching vessels, or on factory ships, or on land closer to the Arctic grounds than our principal ports. In the case of herring, the application of icing and more careful stowage by a few East Anglian boats has already shown the way forward to the first victory over perishability. Diesel propulsion and mechanical refrigeration may be required, and the type of opposition such measures are likely to meet may be deduced from the author's observation that, although trawling may be showing a bookkeeping loss, and crews thereby impoverished, associated coaling, icing and supplying concerns can still pay dividends, a procedure justly resented by trawlermen.

With the consummation of this second victory over the perishability factor, the supply factor will once more take the stage, and appropriate research called for as a prelude to international action to conserve our stocks of Arctic cod and North Sea herring once it has been shown that these, too, are being overfished.

The Fish Gate

The Fish Gate was one entrance to old Jerusalem, and it is the author's hope that the study of commercial fishing attempted in this book—" And a cry went up from the Fish Gate "—will be the forerunner of further considerations of the whole structure of industry in modern conditions.

A few minor points of criticism may be worthy of notice in order of occurrence. While not disputing the nutritive advantages of fish, it is interesting news, if true, that variety of protein intake improves its availability. Again, after stressing the perishability of fish, it seems illogical to allow the æsthetics of a well-arranged fishmonger's slab to outweigh the advantages of keeping in a refrigerator until the moment of sale.

Finally, on page 151, surely Marx is not being saddled with " The Law of Diminishing Returns " of Ricardo, Malthus and Co., whom he so trenchantly refuted. " The Law of the Declining Rate of Profit " of that " little-read philosopher ", as the author styles him, is quite a different tendency altogether and derives its force from the very effect of continuous improvements in technique neglected by the classical economists.

The book contains a number of photographs and drawings illustrative of various facets of the fishing industry.

Measuring Juiciness of Meat

MECHANICAL determination of juiciness of meat samples, avoiding the uncertainties of organoleptic ratings, is possible thrpugh measurement of the juice expressed under controlled conditions. A specially adapted laboratory hydraulic press is used. Pressure on a 25- to 35-gram sample is increased gradually until it reaches 9,800 lbs., and is held at that figure for 5 minutes. A temperature of 50° C. is maintained in the test apparatus. The difference in weight of the sample before and after expressing the juice is taken as a measure of the juiciness. The method appears to be suitable for beef, lamb and pork when the variation in juiciness is due to animal production factors or to the internal cooking temperatures.

Dehydrated Eggs in Canada

HENRY B. BEES.

THE APHORISM " Eggs is eggs " is being, like many others, rapidly contradicted these days by modern science, as perishable eggs become non-perishable egg powder. Canadian poultry-keeping, under war stimulation, with prices advanced, cheap feed in abundance, and available electricity to lengthen the winter hours of daylight, is becoming more profitable. White Leghorn breeds are by far the most popular, for they are record layers with minimum feed consumption. Many poultry-houses are now artificially heated, and to ensure healthy flocks cod-liver oil and mineral foods are supplied regularly. Collection of eggs, mostly by rail, is now standardised throughout the Dominion by the use of 30-dozen boxes with moulded separators of cardboard to obviate jar. Eggs received at storage plants are tested by electric light on moving conveyor belts.

Storing the Eggs

For a while in February, 1942, a " bottleneck " appeared in the egg business, but authorities soon devised a means of storing the eggs. From the Borden plant in Winnipeg came the idea of using galvanised iron moulds lined with heavy Kraft paper, spot-welded to prevent leakage, and with flaring sides, to chill the frozen mass of broken eggs, each mould to hold 40 lbs. of liquid. After 24 hours of quick freezing, contents could be tipped out, stacked in refrigerator cars, and shipped to drying plants. By June, 1942, the original plant in Winnipeg was handling 1,000 to 1,200 cases per day. Now there are seven of these plants in convenient centres across Canada, mostly operating on a 24-hour basis. Grades A and B eggs only are used.

The " breaking-room " girls look quite natty in their white uniforms, and are swiftly accurate in their work as they crack the eggs on upturned knife blades, examine and smell each three in a special cup, and drop the contents into containers. If rejected, the cup goes to a special worker, who hurries it off for sterilisation. Arms are bare of both sleeves, and jewellery and cosmetics are barred, for " off-colour " flavours must be detected. Into special receiving tanks equipped with recording thermometers the egg " mélange " goes for an hour's cooling. No detail is omitted to ensure scrupulous cleanliness in the breaking process, synthetic detergents and chlorine or steam sterilisation in the periodical " clean-up " of vessels being imperative. Shell-buckets, too, receive due attention. Excellence of flavour cannot be obtained without the utmost care.

The Drying Room

The well-lighted drying-room has a distinct air of " efficiency plus ", as its large machines (160 ft. by 50 ft. each) receive the *mélange*. If in frozen blocks (the usual form), these must be ground and thawed. A smooth, homogeneous mass is next secured in mixing vats. Now this creamy liquid is forced up 40 feet and high-pressured through a fine-spray nozzle. The droplets thus formed meet continuous streams of super-dry air as they fall to the bottom and lose their moisture. Twin scrapers work from both ends of the floor to move the resulting powder to the middle of the machine into 160-lb. barrels for shipment. Cleanliness here is scrupulously observed, for human hands must never touch the product, and the barrels are covered as soon as full. The whole process strikes one as remarkably simple, and it is strange that it took a total war to evolve such a tremendously efficient method of storing this invaluable protein food, for eggs in their raw state are notorious for being rarely fresh enough to suit dainty palates, and here, less its 95 per cent. of moisture, is the whole meat of the egg, flavour included.

Quality Standards are Rigid

Rigid standards protect quality in this new food product of Canadian farm-and-city co-operation. Not more than 5 per cent. moisture is allowed; palatability must reach 7·5 in the English scale; and bacterial content must not exceed 500,000 per gram. Special types of bacterial infection bar it completely for export. Grade B powder, the second quality, intended for baking purposes, is allowed slightly lower grades, but below this is banned as far as export goes. Some Winnipeg firms with packaging equipment idle because of war shortages in their special lines, have taken over the business of packaging this powder for the local retail trade. The 14-lb. size is handy for restaurants, the 5-oz. and 2½-oz. for families. In Canadian mining camps and such places the powder is a real boon, for poultry are scarcely ever kept there, and transportation costs almost prohibit the importation of fresh eggs. The powder reconstitutes readily with water and milk, and the " scrambled eggs " thus produced are excellent. It is noteworthy that until 1942 eggs were broken and packed in 50-lb. pails for shipment to large bakeries all across Canada. Now, in view of the superiority and lower price of the powder, this method of shipment of eggs is almost entirely out of date.

British Consumption

Wartime Britain consumes much of the new product. In one recent year alone 12,000,000 lbs. of the powder was shipped there from Canadian drying plants. The British Ministry of Food has also placed large orders in Canada for the 5-oz. packages. Thus the poultry-keepers of North America are ensured a steady demand as long as the war lasts. Even later, when the aggressors are for ever silent, this valuable protein-rich food, easily handled and stored, and with its original flavour sealed, will doubtless appear as a standard commodity, popular everywhere, in the markets of a recovering world.

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

News from the Ministries

Appointments

Sir Percival Bower

Major Lloyd George, Minister of Fuel and Power, has appointed Sir Percival Bower, M.B.E., J.P., to be a member of the Central Electricity Board in succession to Alderman William Walker, who is retiring after seventeen years' service on the Board.

* * *

Mr. W. W. Marsh, C.B.E.

The Minister of Fuel and Power announces that he has appointed Mr. W. W. Marsh, C.B.E., to be Regional Controller for the Eastern Region, with effect from January 24, 1944, in succession to Mr. H. H. Holmes, who was transferred to the Headquarters of the Ministry as Director of Services.

Mr. Marsh has been Regional Petroleum Officer for the Eastern Region and was formerly Director of Establishments at the Ministry of Labour.

* * *

Mr. J. Maud

Lord Woolton, Minister of Reconstruction, with the Prime Minister's approval, has appointed Mr. John Maud, at present the acting second secretary of the Ministry of Food, to his official staff, with the rank of second secretary.

In his new sphere Mr. Maud is expected to continue to devote much attention to food and ways and means of meeting needs after the war. He has had considerable experience of food problems during the war, and, of even more importance in his new post, of the plans which are being shaped for meeting the situation which will exist after the fighting has ended.

He was the senior British official in the delegation which accompanied Mr. Law to the conference on nutrition at Hot Springs, and he was one of the officials sent out to help Colonel Llewellin, the Minister of Food, at the first council meeting of UNRRA at Atlantic City. Now in effect he becomes the food member of Lord Woolton's staff.

* * *

Mr. Arthur W. Kenyon

The Minister of Works has retained Mr. Arthur W. Kenyon, F.R.I.B.A., M.T.P.I., as Consultant on matters affecting the design and planning of experimental and demonstration houses. The Minister is also receiving in this connection the advice of a panel of Architects, nominated by the President of the Royal Institute of British Architects, consisting of Messrs. T. C. Howitt, D.S.O., F.R.I.B.A., C. H. James, A.R.A., F.R.I.B.A., and L. H. Keay, O.B.E., F.R.I.B.A.

Food Orders

The Food (Restriction on Dealings) Order, 1943

The Minister of Food has made the Food (Restriction on Dealings) Order, 1943, which will come into force on March 1, 1944. This Order revokes and substantially re-enacts the Food (Restriction on Dealings) Order, 1941, and the amendments thereto. For the purposes of this Order, sales to manufacturers, caterers and institutions are deemed to be sales by wholesale.

All traders whose principal business is that of wholesalers require to be licensed under the Food (Restriction on Dealings) Order for the commodities shown in the First Schedule to the Order. Traders at present licensed under the Food (Local Distribution) Order whose business with manufacturers and establishments now necessitates their being licensed under the Food (Restriction on Dealings) Order should apply for a form of application as soon as possible to the Chairman of the Area Provisions and Groceries Committee, whose address can be obtained from their Local or Divisional Food Office.

Bacon has been excluded from the Schedule to the new Order and wholesalers of bacon will be licensed under another Order.

Arrowroot has been added to the commodities for which a licence to sell by wholesale under the Food (Restrictions on Dealings) Order, 1943, is required. Wholesalers licensed under the Order to sell cornflour may sell arrowroot without holding an additional licence for the purpose. Similarly, any trader licensed to pre-pack cornflour may pre-pack and sell arrowroot. Any wholesaler regularly trading in arrowroot who is not licensed to sell cornflour should make application for a licence in the first instance to the Chairman of the Area Provisions and Groceries Advisory Committee, whose address can be obtained from any Food Office.

* * *

The Flour Order, 1944

The Minister of Food has made an Order which consolidates the Flour Order, 1943, and its three amending Orders. The new Order came into force on January 30.

Apart from consolidation, the new Order provides a fresh definition of "export", which differentiates between flour shipped as ships' stores and flour exported from the United Kingdom.

Licensed flour factors in Northern Ireland have been excluded from the operation of Article 9, which prohibited them from obtaining flour except from persons named in their licence, as their deliveries are already controlled under Article 22.

The price of self-raising flour sold by flour-millers, licensed factors or importers "in bulk"—*i.e.*, in containers of more than 28 lbs.—has been raised from 44s. 3d. per 280 lbs. to 45s. 3d. per 280 lbs.

A simplified scale of additional charges for bags of various sizes is provided in the new Order and has been expressed, in the case of the smaller sizes, in terms of 288 lbs. and, in the case of the larger sizes, at a rate per bag.

The Cheese (Control and Maximum Prices) Order, 1943

The Minister of Food has made the Cheese (Control and Maximum Prices) Order, 1943. It revokes and replaces the Cheese (Licensing and Control) Order, 1940, as amended (S.R. & O. 1940 No. 1367 and 1941 No. 695), the Cheese (Maximum Prices) Order, 1941 (S.R. & O. 1941 No. 563), the Soft Cheese and Curd Cheese (Maximum Retail Prices) Order, 1941 (S.R. & O. 1941 No. 945) and the Processed Cheese (Control and Maximum Prices) Order, 1942 (S.R. & O. 1942 No. 986).

* * *

The Butter (Control and Maximum Prices) Order, 1943

The Minister of Food has made the Butter (Control and Maximum Prices) Order, 1943. It revokes and replaces the Butter (Requisition and Control) Order, 1939 (S.R. & O. No. 1255), the Butter (Requisition and Control) (Northern Ireland) Order, 1939 (S.R. & O. 1939 No. 1482), the Butter (Licensing and Control) Order, 1940 (S.R. & O. 1940 No. 4), the Butter (Maximum Prices) (No. 2) Order, 1940, as amended (S.R. &. O. 1940 Nos. 773 and 1247; 1941 Nos. 666, 1307 and 1753; and 1942 No. 2330) and the Prepacking of Butter (Control) Order, 1942 (S.R. & O. 1942 No. 1963).

Animal Oils and Fats

The Ministry of Food announces that the Animal Oils and Fats (Provisional Control) Order, 1939, the Animal Oils and Fats (Saponification and Splitting) Order, 1941, the Technical Tallows and Greases (Home Melt) (Maximum Prices) Order, 1941, and the Dripping (Maximum Prices) Order, 1943, have been revoked, and that the provisions of these Orders have been re-enacted and consolidated in a new Order—the Animal Oils and Fats (Control and Maximum Prices) Order, 1943.

The only changes of importance made by the new Order are as follows: (*a*) quantities of not more than 2 cwt. of home melt tallows and greases are released from the maximum price control; (*b*) the percentage of free fatty acids allowable in dripping is reduced from 2 to 1·5; and (*c*) suet is removed from the schedule of specified oils and fats (shredded suet is controlled under the Manufactured and Pre-packed Foods (Control) Order, 1943).

In the new Order the maximum prices for first-hand and wholesale sales of dripping include costs of delivery.

The new Order came into force on January 16, 1944.

Large Gathering at Food Education Society Lunch

It was a distinguished gathering that met at the Food Education Society luncheon on January 31, at which Lord Woolton, Minister of Reconstruction and former Minister of Food, was the guest of honour.

Lord Horder, who presided, said: "History will say of him—in a time of unprecedented stress—this man fed the people. The people's health for generations will reflect his wise and able stewardship."

Lord Woolton said that he could not understand why no University in Britain had a Professor of Nutrition to teach even the medical profession the relationship of food and health.

"Is it dreaming too much," he asked, "to wonder whether in the days not far distant we might have doctors believing so much in the practice of nutrition that their belief will be expressed in the hospital diet? I like to think of hospitals as centres of positive health—places from which people will come not only minus an appendix but with new instructions on how to keep well."

Mentioning post-war reconstruction, he said that their minds almost inevitably went in the direction of reform. But he added: "Do not let us decry everything that there was in the past, because it was not completely bad; if it had been it would not have been able to produce us and, what is still more important, our children, who have certainly demonstrated that the children of Britain are of very high quality indeed."

Among the large number of guests were the following: Lord and Lady Woolton, the Dowager Lady Swaythling, the Earl of Portsmouth, Lord Southwood, Lady Rhys Williams, Sir Arthur Abrahams, Sir George Aylwen, Sir Joseph Barcroft, Sir Geoffrey Clarke, Sir Bernard Docker, Sir Jack Drummond, Sir Robert McCarrison, Dame Louise McIlroy, Sir Allan Powell, Sir Samuel Runganadhan, Mr. S. M. Bruce, Rt. Hon. A. Greenwood, Col. the Rt. Hon. J. J. Llewellin, Rt. Hon. T. Williams, Rt. Hon. Henry Willink and Mrs. Willink, Mr. R. M. Campbell, Prof. E. C. Dodds, Dr. Haden Guest, Dr. John Hammond, Dr. Leslie J. Harris, Dr. R. Heindel, Dr. Charles Hill, Mr. F. Hudd, Mr. W. J. Sandeman, M. André Simon, Mrs. Mavis Tate, Mrs. Joan Woolcombe, Dr. W. R. Wooldridge.

Lord Woolton and Lord Horder light up after Lunch

Plant and Equipment

Leather V-Belts

Leather arranged in the form of flat continuous bands and used as the medium of transmitting mechanical power of large magnitudes from one source to another needs no introduction, since this method appears to have its origin in antiquity; leather made up into small cross circular bands has also been employed for a considerable period as a means of transmitting relatively small powers, but the application of solid continuous strips of wedge-shaped or trapezoidal section leather suitable for replacing V-belts of rubber and textile fabric construction, manufactured by The Benson Vee Leather Co., Ltd., is of recent origin and represents an innovation of paramount importance to all engineers.

The type of V-belt composed of rubber and textile fabric is usually moulded endless to suit a wide range of sizes and lengths, the lengths or circumferential dimensions of the belts are, of course, limited because of the extra cost entailed in carrying large stocks of special moulds, and on this account the user has often to design his drive to suit the maker's predetermined sizes, a procedure that might not always be a convenient one.

The claim is sometimes made that the absence of a joint is an advantage in so much that the endless belt promotes a steadier drive and ensures uniform strength throughout; there are, however, occasions where an endless belt can be a disadvantage, particularly if it means that due to this feature the pulleys have to be overhung or modifications made to the machine in order to facilitate the fitting of the belts without having to partially dismantle the machine.

The installation of this type of leather V-belts is an affirmative answer to the request for everyone to conserve rubber, and provided their use is for work of national interest, no permit is required before they can be supplied, and further, where the belts are for use on machines for export, the necessary licence is readily granted.

Office Organisation and Practice

The purpose of a booklet (B.S. 1100, Part 10, 1943) just issued by the British Standards Institution, is to give information regarding the practical technique of office and clerical organisation.

Sufficiently simple in its treatment to offer something of value to the needs of the smaller office, this publication also contains the principles of office technique which should be followed in order to meet modern conditions in the larger organisation. Whilst it is principally directed to firms having between 250 and 1,000 employees, yet on the other hand, smaller firms in all branches of industry will find much in it which they can use or adapt to their own advantage. This booklet will, in fact, be found to supply answers to the office problems in a very large proportion of the country's industry; it has, indeed, been written to bring the maximum effect to bear on the national industry in the way of increased "office productivity".

Copies of this booklet—B.S. 1100, Part 10, 1943—can be obtained from the British Standards Institution, price 2s. 6d. post free.

* * *

***Nivoc* Trolley Laboratory.**

Gas Grids

Over 800 trades and industries, most of which can be carried out either in town or country, have been listed by the Gas Industry as users of industrial gas. The better to meet the varying demands of those trades and the domestic needs of those engaged in them, the Gas Industry is planning the concentration of gas production in the most efficient works and the construction of regional gas grids to convey cheap and abundant fuel both to existing areas and to outlying districts at present without gas. New developments will follow the lines of several grids already in operation, with variations to suit local conditions.

* * *

Trolley Laboratory for Milk Tests

The importance of scientific control of food values has been fully shown during the war, and the country's satisfactory food position and general high state of health is in no small measure due to this factor.

W. and J. George, Ltd., proprietors of F. E. Becker and Co.), have long been well known for the equipment of scientific laboratories of all kinds, and their experience was therefore at once available for meeting wartime problems. When the control of milk purity first became a matter of urgency, they collaborated with Dr. J. G. Davis, of the National Institute for Research in Dairying, in the design and production of a Trolley Laboratory carrying all necessary equipment for the performance of quick purity tests on the creamery platform; and they have since been responsible for equipping most of the new Area Laboratories set up under the National Milk Scheme.

Gummed Labels

In pre-war days gummed labels were able to be printed in three, four, six and eight colours, according to the grade of job required. Wartime limitations have reduced these to two, and there are also limitations as to size and colours of paper which can be used.

The Carillon Press Ltd., who specialise in coloured labels on gummed paper, who have been designing them for the retail and distributive trades, are looking forward to resuming their activities in the field of high-grade colour printing and the production of standard and individual styles of labels.

* * *

Power Transmission

The answers to the two questions, Why Leather? Why Laminated? are to be found in a little book entitled *Belting from a Single Strand*, issued by James Hendry, Ltd., patentees and manufacturers of "Laminated" Leather Belting.

Leather possesses qualities of flexibility, elasticity and "grip" found in no other material—qualities essential to the ideal power transmission belt.

Despite somewhat higher initial cost, the durability of leather makes it by far the most economical material for the purpose; being of one homogeneous substance it suffers a minimum of internal wear due to flexion and in this respect is far in advance of woven fabric.

Hendrys' principle of "Laminated" construction provides a solution to several power transmission problems—problems existing even when leather is used for the purpose. The invention brings into use the truly endless belt, overcoming the disadvantages of cement joints, lacings, metal fasteners, etc.—a belt free from unbalanced vibration, ensuring the smooth steady transmission of power.

From a single tested strand of specially tanned stretched leather, the belting is built up to all widths from 1 to 48 inches and upwards, and in a single ply up to 1-inch thick—a belt with all the pliability of the finest ox-hide retained, made yet more flexible by the manner of its patented construction.

"Thermo-Plastics"

One of the chief features in the wartime world of thermo-plastics has been the amazing growth and development of what is known as the wooden moulding technique, as carried out by BX Plastics, Limited. Thermo-plastics are those plastic materials which can be softened on the application of heat and harden again on cooling. There is no chemical change in the material, as is the case with thermo-setting plastics, which cannot be softened again after an initial heat treatment. Consequently the moulding of thermo-plastics in the form of sheets, rods or tubes from simple moulds has been a logical wartime development, especially where relatively small quantities are required of any one particular shape.

Thermo-setting plastics require hardened steel moulds owing to the high pressures which are required during the moulding operation and, therefore, wooden moulds are only suitable for thermo-plastics, where the sheet of material is heated on a hot-plate then placed in the wooden mould and allowed to cool before withdrawal.

Plastic articles can very easily be built up by the aid of suitable cements. These cements consist of solvents of the material being jointed, and thus very strong welds are obtained with ease and rapidity.

One of the characteristics of the present-day plastics industry is the ever-growing range of materials available. None of these materials is sufficient in itself, and the new-comers should be regarded as complementary materials, each having different physical properties. Some are non-brittle at −50° C., others resistant to acids and alkalies or possessed of rubber-like qualities. One plastic is completely moisture resistant after prolonged soaking in water, and yet another is so light that it floats on water. All these plastics are capable of being produced in attractive colours. These developments in the plastics field show possibilities of utilising the materials for food manufacture, where their hygienic and odourless properties offer considerable advantages. They are light in weight. Generally speaking,

The illustration shows part of a measuring device which has been moulded, with some inexpensive moulds, from Bexone F thermo-plastic material. This replaces a metal counterpart which was costly to make, and it has been found that the plastic job gives much more sensitive readings.

the thermo-plastic article is approximately the same weight as a similar article made in light alloy. They are tough and resilient, but it must be borne in mind that being thermo-plastic (that is, softened on the application of heat) they must be used only in conditions where temperatures are not likely to exceed 70° C. Finally, plastics should not be regarded as a panacea for all ills. They have many advantages to offer, and the makers of plastics will always be found ready to give advice to those who are contemplating the use of plastics for a special purpose.

* * *

Calcium Alginate Supplies

Although there is a temporary shortage of sodium alginate (Manucol), which is being used increasingly in certain essential work, ample supplies of calcium alginate are available. The calcium salt is insoluble in water, but viscous solutions can readily be prepared by the addition of certain sodium salts. A simple method of preparing such solutions is to disperse the calcium alginate in water and add a solution of soda ash or suitable sodium salt; sodium sesquicarbonate or citrate can also be used.

There are a number of applications of these viscous solutions. They can, for example, be used to stabilise emulsions and dispersions and to thicken solutions.

Calcium alginate is made in three grades from which solutions of different viscosity can be obtained by the method described above. Grades suitable for food products, pharmaceutical and cosmetic preparations and other purposes are available. Suggestions for using calcium alginate can be obtained on application to Albright and Wilson, Ltd.

* * *

Andrew Ritchie and Eburite

In view of the merging of interest of Andrew Ritchie and Son, Ltd., with Eburite Corrugated Containers, Ltd., London, it has been announced that the identity of the Glasgow firm is to be retained.

Sir James M. Ritchie, J.P., and Lieut. I. Martin Ritchie, R.A., are to be co-directors, in terms of the agreement. Sir James and Mr. Thomas Ritchie have been appointed directors of the Eburite company, and Messrs. J. F. Fielding and N. P. Gold, directors of Eburite, and Mr. Tomlinson, works manager, have been appointed directors of Andrew Ritchie and Sons, Ltd.

The latter firm was started in 1850 by Sir James's father, Andrew Ritchie. The firm grew from a small concern to one whose works cover an area of approximately three acres in Bridgeton, Glasgow. The firm produces all forms of packing cases, cardboard boxes and cartons for all goods by rail, road and sea, and for export. They have been specially known in the past for their production of fancy boxes, which has played a considerable part in the firm's progress. The firm has been closely identified with all activities in connexion with legislation governing the industry as a whole, and Sir James, whose connexion with the trade extends back for 55 years, has taken a leading part in organising the Scottish trade.

Ellison Workers' Exhibition

Sponsored by the Ministry of Supply and supported by other Ministries and Government Departments, an exhibition, the object of which was to show the workers of George Ellison, Ltd., and Ellison Insulations, Ltd., that the work they are doing is a vital part of the war effort, was opened on January 21 by the Lord Mayor of Birmingham, who congratulated the workers present on the achievements of the two firms during 4½ years of war.

The exhibition was divided into two sections, the first part showing the worker how the switchgear and Tufnol they make is used. The switchgear worker, for example, sees in picture and story how in 1940-41 he made switchgear to get the basic industries of coal, iron, chemicals, machine tools and shipbuilding on to a war footing. The second part of the exhibition was devoted to all kinds of weapons of war, and this section included a Spitfire, anti-aircraft guns, a "block buster", a parachutist's folding motor cycle, field guns, armoured fighting vehicles and small arms. In addition, there are some interesting demonstrations by Messrs. Lucas, Ltd., and Messrs Rotol, Ltd.

A view of the Ellison War Weapons Exhibition showing a Lancaster nose, a parachutist's folding motor cycle, a 4,000-lb. block buster, a radio receiver and Rotol aircrews.

News from the Societies

Food Education Society

The Food Education Society has arranged a series of meetings to be held once a month on Monday afternoons. Dr. J. G. Davis, D.Sc., Ph.D., F.I.C., will lecture on March 20, at 8 p.m., and his subject will be "Milk and the Consumer". The meeting will be at the Conference Hall, School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, London, W.C. 1.

* * *

The Chemical Society

The Annual General Meeting for the election of Officers and Council and other business will be held on April 20, 1944. The names of the members of Council who will retire are as follow:

President.—Dr. W. H. Mills.

Elected Ordinary Members of Council.—Constituency I. (South-East England): Dr. H. J. Emeléus, Sir John Fox and Dr. B. C. Saunders; Constituency IV. (North-East England): Professor J. M. Gulland and Professor R. D. Haworth.

The above are ineligible for election to the same office until after the lapse of one year.

In accordance with Bye-law 47, Dr. W. H. Mills, as retiring President, becomes a Vice-President who has filled the office of President.

* * *

Society of Chemical Industry, Food Group

The Committee, exercising the powers vested in it according to the rules, has appointed the following officers for the session 1944-45. (To take effect after the Annual General Meeting, April 26, 1944):

Chairman, Dr. H. E. Cox; Vice-Chairman, not yet appointed; Hon. Treasurer, Dr. J. R. Nicholls; Hon. Editor of Food Group Proceedings, Mr. T. Rendle; Hon. Secretary, Dr. J. H. Bushill.

The present Committee consists of the following:

W. B. Adam, A. J. Amos, A. L. Bacharach, F. Bergel, J. R. Corran, E. R. Dawson, W. P. Ford, C. W. Herd, Osman Jones, B. G. McLellan, E. C. Bate-Smith, W. B. Walker; (Hon. Recorder, J. G. Huntley).

Of these Messrs. A. J. Amos, E. C. Bate-Smith, W. P. Ford and Osman Jones retire and are not eligible for re-election for one year (Rule 7), while Messrs. A. L. Bacharach and W. B. Walker retire and are eligible for re-election (Rule 10).

The Committee has appointed (Rule 5) the latter two members—namely, Messrs. A. L. Bacharach and W. B. Walker—to the 1944-45 Committee, leaving four vacancies to be filled by election by the members.

* * *

The Royal Sanitary Institute

A sessional meeting was held at Bournemouth on February 19, 1944. The following papers were read: "Health Education at Infant Welfare Centres and Wartime Nurseries" by Dr. Vida Stark, M.D., D.P.H. "Food Hygiene of Hotels and Restaurants" by William Riley, Senior Sanitary Inspector, Bournemouth. A discussion followed the papers.

* * *

Scientific Industrial Research

The London Chamber of Commerce has unanimously adopted a Report on Scientific Industrial Research prepared by a Special Committee appointed last June. Apart from the analysis of the present position and emphasis on the vital importance of research to industry and trade, the Chamber considers that the basic essentials needed to "galvanise research in this country into full and fruitful activity" are as follows:

(1) A centralised and planned direction through a Central Research Board;

(2) A far greater stream of money flowing into research;

(3) A larger, better trained and better paid personnel.

The proposal for a Central Research Board is the fundamental recommendation of the Report as this body is envisaged as the focal point in securing co-ordination of effort, the full use and immediate application of every discovery of value to industry, and ensuring that research demanded by the public interest shall be speedily and effectively carried out.

The Report discusses instruction in science and states that the amount of money which it is proposed in the new Education Bill to spend on the development of the technical institutions is quite inadequate. On the subject of personnel, the Chamber points out that it is "useless to increase the provision of education for larger numbers of scientists unless at the same time an increase in the number of positions to be filled by them is assured at a satisfactory remuneration". It advocates the upgrading of salaries paid to scientists in industry, the Universities and the research associations so that scientific investigation may become a more attractive career. It also has something to say on the way in which scientific development could be encouraged by concessions in the matter of taxation.

* * *

The Chemical Council

At the meeting held on January 19, 1944, the constitution of the Council was reported to be as follows:

Representing the Chemical Society: F. P. Dunn, B.Sc., F.I.C., Dr. H. J. T. Ellingham, F.I.C., Dr. W. H. Mills, M.A., F.R.S., and one representative to be appointed in place of Dr. C. W. Davies, who retires.

Representing the Royal Institute of Chemistry: A. L. Bacharach, M.A., F.I.C., Professor A. Findlay, M.A., D.Sc., F.I.C., Sir Robert H. Pickard, D.Sc., F.R.S., and J. C. White, O.B.E., M.C., F.I.C.

Representing the Society of Chemical Industry: C. S. Garland,, B.Sc., F.I.C., Dr. L. H. Lampitt, F.I.C., Professor E. K. Rideal, M.B.E., D.Sc., F.R.S., and Stanley Robson, M.Sc., A.I.C.

Nominated by the Association of British Chemical Manufacturers: Dr. A. E. Everest, F.I.C., Dr. J. Vargas Eyre, F.I.C., J.

Davidson Pratt, M.A., B.Sc., Dr. R. E. Slade, M.C., F.I.C.

Honorary officers for the current year were appointed as follows: *Chairman:* Dr. L. H. Lampitt; *Vice-Chairman:* Professor A. Findlay; *Hon. Treasurer:* Sir Robert Pickard; *Hon. Secretary:* Dr. R. E. Slade.

* * *

Conference on X-Ray Analysis

The Third Conference on "X-Ray Analysis in Industry" has been provisionally arranged to take place in Oxford on March 31 and April 1 under the auspices of the X-Ray Analysis Group of the Institute of Physics. Details will be circulated shortly to members of the Group, and will be sent to non-members on application to Dr. H. Lipson, F.Inst.P., Honorary Secretary of the Group, c/o Crystallographic Laboratory, Free School Lane, Cambridge. The conference will be open to all interested, but it may be necessary to limit the number of non-members of the Group for whom accommodation can be provided.

* * *

Secretaries' President

The newly-elected president of the Chartered Institute of Secretaries for the current year is Mr. H. H. G. Bennett, secretary of J. Lyons and Co.

After taking his B.A. degree at Emmanuel College, Cambridge, he proceeded to an active business career with Lyons. After serving in the last war he returned to Lyons, becoming, in eighteen months, assistant secretary of the company. In 1926 he was appointed secretary, and eight years ago became an employee director, which office he holds concurrently with his secretaryship.

* * *

Promoting Industrial Research

Among the recommendations made in the F.B.I. Report on Industry and Research was one suggesting the establishment of an organisation whose principal objects would be to stress continuously the need for industrial research and to promote and foster it in all possible ways.

The form and functions of this suggested organisation were discussed at a recent Conference summoned by the F.B.I. and attended by representatives of the Royal Society, the Department of Scientific and Industrial Research, the Universities, and the Research Associations. A full discussion took place, and a sub-committee was appointed to inquire further into the subject and to report back.

* * *

Therapeutic Corporation of Great Britain

The Therapeutic Corporation of Great Britain has elected the following officers for the year 1944: *Chairman, Board of Directors*: Mr. H. Jephcott (Glaxo Laboratories, Ltd.) succeeds Dr. T. B. Maxwell (May and Baker, Ltd.); *Deputy Chairman, Board of Directors*: Dr. F. H. Carr (The British Drug Houses, Ltd.) succeeds Mr. H. Jephcott (Glaxo Laboratories, Ltd.); *Chairman, Research Panel*: Dr. A. J. Ewins (May and Baker, Ltd.) succeeds Dr. F. L. Pyman (Boots Pure Drug Co., Ltd.); *Deputy Chairman, Research Panel*: Mr. F. A. Robinson (Glaxo Laboratories, Ltd.) succeeds Dr. J. W. Trevan (The Wellcome Foundation, Ltd.).

The Corporation has appointed Dr. Frank Hartley as secretary, to take up duties early in 1944. The new offices of the Corporation are at General Buildings, 99, Aldwych, W.C. 2.

* * *

British Society of Animal Production

The British Society of Animal Production was formed recently in a Bloomsbury lecture room. It will link scientists and farmers interested in stock raising.

Dr. John Hammond, the Cambridge authority on animal genetics, was elected president. A committee was appointed, consisting of Dr. A. B. Fowler, Mr. Alec Hobson, Mr. James Mackintosh, Professor W. C. Miller, Mr. W. A. Stewart and Professor R. G. White.

Immediately after its inauguration the Society held its first meeting in the London School of Hygiene and Tropical Medicine. Breeding of dairy cattle, beef cattle and dual-purpose cattle were discussed.

Mr. S. W. Mansfield, director of the Cambridge University farm, expressed his belief in cattle bred for both beef and milk. He was sorry to see that "no-purpose" cattle were going about masquerading as dual-purpose animals.

Obituary

Mr. W. G. Lovell

Mr. W. G. Lovell, C.B.E., who died recently, was chairman of Lovell and Christmas. He was a good friend to "Barts" and other trade charities, particularly the Albert and Victoria Hospital Aid Society.

* * *

Mr. David Muir

A well-known figure throughout the grain and flour trades not only in Scotland, but also in Canada and the U.S.A., has been removed by the recent death at Seamill of Mr. David Muir, formerly manager of the large flour-milling department of the Scottish Co-operative Wholesale Society, whose chief production centres are at Regent Mills, Glasgow, and Chancelot and Junction Mills, Leith, and a post which also included the supervision of the Winnipeg depot of the Society.

Mr. Muir retired from that post about two years ago and had gone to reside at Seamill.

* * *

Mr. William T. D. Hartley

The death has occurred of Mr. William T. D. Hartley at the age of 62, after a brief illness.

Mr. Hartley was well known in the confectionery, fruit preserving, canning and allied branches of the food industry, and was a member of the Executive Committee of the Rochdale Engineering Employers' Association.

Formerly he was in business with his father at Bury in the firm of Thomas Hartley and Son. He became a director of the firm in 1924, when Thomas Hartley and Son were merged into Wm. Brierley, Collier and Hartley, Ltd.

Overseas Items

Brazilian Rice Agreement

An agreement was signed recently at the Ministry for Foreign Affairs by the Ambassadors of Great Britain and the U.S.A., whereby Brazil earmarks its exportable balance of the 1944-45 rice crop for these two countries. The agreement was signed in the office of the Chancellor Aranhas in the presence of the Ministers for Finance and Agriculture.—*Reuter.*

* * *

Brazilian Rice Crop

The rice crop in the State of Rio Grand do Sul is estimated at 7,000,000 sacks, of which 4,000,000 will be exported to Great Britain, leaving the remainder for internal consumption.

* * *

American Spaghetti for Naples

Naples is now eating American spaghetti—and liking it.

The first shipment of the white paste went on sale in the food stores recently, Neapolitans queueing up for as long as four hours to buy one pound.

It was the first spaghetti of any kind publicly sold in Naples since September, and the first light-coloured spaghetti sold for several years.—*Reuter.*

* * *

Sugar Research Work in France

The German official news agency reports from Paris that the French Government, with the financial assistance of French sugar manufacturers, has founded an institute for sugar research work. All results obtained in the domain of sugar manufacture, cultivation of sugar-beet and economical use of by-products will be made available to French sugar manufacturers and sugar-beet cultivators.—*Reuter.*

* * *

British Bulls

A total of 769,000 pesos was recorded at a recent auction in Buenos Aires of 42 bulls imported from Britain. The highest individual prices were 75,000 and 50,000 pesos.—*Reuter.*

American Chemical Society

Dr. Carl Shipp Marvel, professor of organic chemistry in the University of Illinois, has been elected president of the American Chemical Society for 1945. Dr. Marvel took office as president-elect on January 1, 1944, when Dr. Thomas Midgley, Jr., internationally known for his discovery of tetraethyl lead, became president.

Dr. Marvel was recently awarded the 1944 William H. Nichols Medal of the New York Section of the American Chemical Society, one of the highest distinctions in chemical science.

* * *

Ulster

A little pamphlet has been recently issued giving a few salient facts about Ulster, the bastion State, and its activities in peace and war. It is well illustrated and succinctly gives the main facts with reference to the trade, Parliament, war activities, etc., of Northern Ireland.

* * *

New Zealand Food Worries

New Zealand may not be able to meet her present and post-war obligations in food production if the present decline in primary products is not checked, states a Wellington message, quoted by Reuter.

Reductions in dairy herds, the loss of fertilisers, shortage of labour and difficult seasons have all combined in a steady drop in dairy produce in the last two years.

Butterfat products fell by 21 per cent., and for the first two months of the present season it has fallen a further 7 per cent.

Rural opinion is now inclined to favour a combination of various farming interests into one organisation so that the case of primary production in all its branches can be presented with a united front.

Farmers say that butter rationing in a country which can produce so freely shows that the real problem is not being faced.—*The Financial News.*

Canadian Bacon for Britain

Mr. J. C. Gardiner, Canadian Minister of Agriculture, has announced that negotiations for a four-year bacon contract with Britain are in progress.

The present two-year bacon contract with the U.K. provided for delivery of 900,000,000 lbs. in two years, of which more than 500,000,000 lbs. would be delivered in 1944..

The Canadian Government, the Minister further announced, will pay premiums to farmers for high-grade hogs at the rate of $3 for Grade A select hogs and $2 for Grade B.—*Reuter.*

* * *

Empire Took 60 per cent. of Lend Lease Food

Sixty per cent. of more than 1,000,000,000 lbs. of "lend-lease" food and other agricultural products shipped from the U.S. last November, went to the British Commonwealth.

This information was given recently, jointly by the U.S. War Food Administration and the Foreign Economic Administration.

Russia received about 38 per cent. of the total and about 2 per cent. went to North and West Africa. Small quantities were shipped to Dutch possessions and to Greece.—*Reuter.*

* * *

Troops May Drink Maté

Indications that Brazil intends to enter the post-war tea market on a large scale with the national Brazilian drink Maté—which has certain tea-like qualities—are seen in the presence in Washington of Dr. Generoso Ponce, representing the National Maté Institute, Brazil.

Dr. Ponce told a Press Conference that he had already conferred with U.S. Army and Navy officials, and has other conferences scheduled regarding the use of Maté by Allied troops.—*Reuter.*

* * *

No Chocolates for Germany

According to the *Münchener Neueste Nachrichten*, sweets were not to be manufactured in Germany after January 1. The exhaustion of cocoa stocks had for some time past prevented the manufacture of chocolate.

Company Meeting

Allied Bakeries

The eighth annual general meeting of Allied Bakeries, Limited, was held recently in London.

Mr. S. Hodkinson presided in the absence through indisposition of Mr. W. Garfield Weston, M.P., the chairman of the company, and read the statement which had been prepared by Mr. Weston, from which the following is an extract:

Last year I referred briefly to the fact that we had acquired control of H. W. Nevill, Ltd. I am pleased to inform you that the potential earnings of this company have been exceeded by a substantial margin.

Our liquid position has improved slightly during the year, liquid assets being £2,307,961, exceeding current liabilities by £356,700, against a surplus of £366,050 in 1942, but the net amount of the second interim dividend of 5 per cent., amounting to £34,955, has been included in total liabilities this year, so that our liquid position is £25,600 better.

One other item to which I would call your attention is the increase of £51,343 in our total reserves to £390,035. The special Preference dividend reserve of Weston Foods, Ltd., now amounts to £67,500, representing three years' net dividend on the issued 6 per Cent. Preference shares, and the directors of that company are accordingly freed from their undertaking to restrict the dividend on the Ordinary shares to 10 per cent.

Your company's total contribution to the National Exchequer in taxation, including N.D.C. and income-tax and E.P.T., represents more than 75 per cent. of the net earnings of the operating companies. You will see that the amount brought forward to the credit of the profit and loss account this year is approximately £17,600 higher than last year, but the transfer to depreciation reserve has also increased to make provision for the additional assets acquired during the year.

After payment of the Preference dividend, and a dividend of 10 per cent. on the Ordinary shares, there remains a balance to carry forward of £128,022, as against £88,313 brought in from 1942. Your directors do not recommend any further payment of dividend on the Ordinary shares because they constantly have in mind the necessity for considerable capital expenditure after the war.

You may expect me to express some opinion as to the prospects of our business in the immediate future, but I can only say that we are largely dependent upon circumstances beyond our control: as, for example, the available supply of raw materials for confectionery and biscuit making.

The report was adopted.

Personalia

Appointment of Canteen Adviser

Mr. S. F. Smith, manager of the Industrial Catering Department of John Gardner (London), Ltd., food suppliers and caterers, has been appointed by the Minister of Labour to act assessor to the Catering Wages Commission.

He is to advise the Commission on industrial catering problems and post-war development of works' and staff canteens. He was chosen for this work upon the recommendation of the employers' and trade union sides of the National Joint Industrial Council for the Industrial Catering Trade.

* * *

Mr. R. B. Bickerdike

Bowdler and Bickerdike, Eagle Chemical Works, Church, Lancs, announce the retirement of Mr. R. B. Bickerdike, after 38 years in the chemical trade.

The remaining partner, Mr. H. E. J. Cory, continues the business as sole proprietor.

The firm manufactures a range of Chlorinated Phenols, Preservatives, Anti-mould and Anti-mildew Compounds, suitable for a variety of purposes.

Mr. Cory will continue from the same address his separate business as merchant and exporter of dyes and specialised chemicals, in addition to maintaining his consulting practice.

Post-War Plans

Synthetic Rubber

Up to 500,000 tons of synthetic rubber can be produced yearly in existing plants after the war at an estimated price of 15 cents. a pound, declared John L. Collyer, president of the B. F. Goodrich Company.

He expressed the opinion there will be ample facilities to produce the tyres needed to meet the combined post-war replacement market and the annual estimated production of 6,000,000 automobiles each year for several years. Overall demand for tyres, he estimated, may approximate 70,000,000 annually for the first four years.—*Reuter.*

* * *

Increased Use of Catalysts

The increased use of catalysts in industry and the probable very great expansion in the near future in the food, plastics and synthetic rubber industries was discussed by Professor James Kendall, D.Sc., F.R.S., when he addressed the Royal Society of Edinburgh on January 10 on "Catalysts". During his talk he gave practical experiments to demonstrate the points made. Catalysts are substances which increase the speed of chemical reaction without themselves being permanently changed, and are now of great industrial importance, as, for instance, the manufacture of ammonia from oxygen and nitrogen, and the oxidation of this ammonia to nitric acid for explosives and fertilisers.

It has been discovered in recent years that the effect of a single catalyst could be greatly enhanced by the use of a secondary substance or promotor. They had also discovered that the use of negative catalysts slowed down the process of reaction and preserved materials which were normally unstable. Catalysts were being used at the present time in many new directions, of which the most important were in the manufacture of synthetic plastics including synthetic rubber, and in the manufacture of synthetic vitamins. It was likely that the coming years would see a very great extension of their use in the production of synthetic foods.

Information and Advice

Waxed Cardboard Containers

9,047. *If waxed cardboard containers are used to pack dry foodstuff is it necessary to line with paper? If the flavour of the food is not influenced by this package can it be assumed that waxed cardboard is inert and harmless, not contaminating the food? Or are there different types of waxed board in use, and are they different in their hygienic properties?* (Yorks.)

The matter of the lining of waxed containers depends on circumstances. In most cases it would probably be advisable to line them. You give no information on the nature of the products to be packed. We suggest you get into touch with suppliers, giving details.

The names of suppliers of waxed containers were given.

Dried Egg

9,056. *Required, information regarding the merits or demerits of using dried egg in the making of cakes without reconstituting it first. Does the protein require time to imbibe the maximum quantity of water?* (Cambs.)

You cannot use dried egg as a powder without reconstituting it first. What is required is to obtain the albumen in as similar a state as it exists in the fresh egg; it would take too long to go into the action of albumen on cake texture, but it is a well-known action and you will find this in the appropriate textbooks.

We have not ascertained the exact time required to reconstitute dried egg. Apparently, from the directions, it is quite short. We suggest that this is an interesting test to make in your laboratory.

Lead in Sealing Compounds

9,084. *Required, information regarding the permitted lead content, if any, in a compound for sealing bottled fruit, and which is used in a similar way to the old-fashioned paraffin wax. As far as we can gather, there does not seem to be any ruling on this point, but we wish to be on the safe side and comply with any regulation which may exist.* (Yorks.)

There is no standard laid down with regard to the amount of lead which may be present in a sealing compound, nor, for that matter, is there a legal standard for the amount of lead which may be present in a food, although there are certain maximum quantities of lead which are generally accepted for different foods. With regard to a sealing compound, a packer must bear in mind the possibility of lead being transferred to the food in the container. Tin-lined lead tubes are now being used very largely for toothpastes and other commodities, and in every case the thing to be considered is the amount of lead which will be dissolved from the container. Another analogy which may be useful is that of red rubber, which contains antimony sulphide. This is used very largely for sealing foodstuffs, including fruit and acid foods, but, as the antimony is not dissolved out of the rubber, its use is perfectly safe.

In dealing with bottled fruit it might be well to remember that lead poisoning can be caused by 0·7 parts of lead per million in cider, which is consumed in appreciable quantities. The lead is here present as soluble organic salts, and it would doubtless go into solution in bottled fruit as a soluble organic salt of lead, though bottled fruit is not likely to be consumed in such large quantities as cider. To be on the safe side, however, we would suggest that it would be unwise to employ a sealing compound which would be likely to yield more than 10 parts per million of lead to the fruit after prolonged storage.

Information Supplied

9,024. *Manufacturers of a machine for extracting stones from dates.* (Warwicks.)

9,028. *Firms supplying glass jars and capping machines.* (Kenya Colony.)

9,032. *Information on the process of sterilisation of low-strength wines in order to insure freedom from the danger of developing secondary fermentation when in bottle.* (Eire.)

9,046. *Name of firm marketing or manufacturing quick curing salt.* (Yorks.)

8,936. *Information on pectin as a substitute for gums.* (Hereford.)

Information Required

9,114. *A fat substitute suitable for pie shell making.* (Lancs.)

9,099. *We are addressing you on behalf of a proposed company, the associates of which are all British subjects and are specialists and technicians in their individual capacities of the commodities they intend handling. These gentlemen are at present all holding high executive positions in leading South African companies importing these commodities, and the volume of business passing through their hands amounts to hundreds of thousands of pounds per annum.*

The purpose of the proposed company is to be the central organisation of an indent representative house for these commodities and any associated products, both raw and manufactured, and branch offices will be established in all the principal centres in the Union of South Africa and the Rhodesias. The object of the formation of this joint venture is to establish a nucleus of specialised representation of overseas suppliers by combining all their efforts and experiences.

The principals are all of good standing and repute and are thoroughly reliable business men, and we feel that any undertaking to transact business on behalf of overseas suppliers will be carried out in a straightforward, honest, efficient and business-like manner.

The commodities they intend handling as representatives are all types of foodstuffs, canned or otherwise.

We would be glad if we could ask for your assistance in contacting the various suppliers of these commodities in your country through the medium of your valuable publication and the registration of our enquiry in your records. (South Africa.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Improvements in or relating to Methods of Packaging and Freezing Flowable, e.g. Liquid or Semi-Liquid, Food Products

A method of packaging and quick-freezing a flowable food product in a relatively thin normally collapsible container which comprises confining said container sufficiently to maintain its shape and prevent collapse, filling said confined container with said product, closing said container tightly around the confined flowable product to eliminate air from the container and sealing the confined container, then subjecting said container to refrigeration to quick-freeze said product while maintaining at least one side of the container under yielding pressure, whereby a tightly wrapped quick-frozen block of the product is obtained.

A method of packaging and quick-freezing a flowable food product in a relatively thin flexible rectangular container which is not self-sustaining when filled with said product comprising the steps of confining said container to maintain its shape, filling the container while so confined to provide a rectangularly shaped mass of said flowable product and closing and sealing the top of the container about said confined mass, quick-freezing said product by subjection of the confined container to refrigeration, and applying yielding pressure to the top of the container to maintain its rectangular shape while permitting expansion of said product during freezing, and then removing the quick-frozen package from confinement.

The method as claimed above in which a relatively flat thin rectangular bag having an open mouth is filled with the said product and the mouth of the bag sealed and folded while confining the sides of the bag within rigid walls to maintain its shape, the product being then quick-frozen in the bag while so confined by refrigerating said walls, yielding pressure being applied to the folded mouth of the bag to maintain a flat rectangular surface and permit expansion to take place.

The claim includes the following cases: Where the confined container is quick-frozen by being placed between horizontal refrigerated plates; also in which the container is refrigerated between and with its wide sides in contact with horizontal refrigerated surfaces maintained at a temperature sufficiently low to quick-freeze said product, contact with said surfaces being maintained by confining the narrow sides and one end of the bag while applying yielding pressure to the mouth end of the bag.

549,997. *Frosted Foods Limited.*

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

553,133. TUNLEY, A. A., and BAKER PERKINS, LTD.: Feeding of biscuits or other sweetmeats or other articles to chocolate enrobing-machines and the like.

553,141. NATIONAL OIL PRODUCTS CO.: Preservation of perishable materials.

553,257. DEHN, F. B. (Mining Process and Patent Co.): Cleaning and husking of cereal grain.

553,338. BRITISH CELLOPHANE, LTD.: Moisture-proof sheet wrapping material.

553,385. UNIVERSAG TECHNICAL CO., LTD.: Stopper serving as means for transferring part of the contents of a container to another vessel without contact with the atmosphere.

553,465. COMMERCIAL SOLVENTS CORPORATION: Processes and mash for the production of riboflavin by butyl alcohol-producing bacteria, and the products resulting therefrom.

553,500. ATOMISED FOOD PRODUCTS, LTD., and SCHMIDT, H.: Process for the production of dried soups.

553,521. GEE, L. F., and GEE, Jun., J. A.: Paper or other containers for foodstuffs and other commodities.

553,600. UBEDA, J. S.: Process for the preservation of meat.

553,633. EVANS, C. H.: Treatment of insect-damaged wheat.

553,842. SIMON, LTD., H., and DINSDALE, J. W.: Treatment of wheat germ.

553,932. WHEADON, H. J.: Refrigeration plant.

554,010. DISTILLERS CO., LTD., and MEYER, E. A.: Preparation of dry yeast products.

554,026. CLAY, C.: Manufacture of cream centres for sweetmeats and their fondant bases.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

UNWIN SOWTERS.—622,320. *Advertised before acceptance. Section* 18(1) (*proviso*). Cereals (prepared for food for human consumption) and flour. **Unwin Sowter, Ltd.**, Sowter Road, Derby; Millers.

STANBURYS.—622,321. *Advertised before acceptance. (Section* 18(1) (*proviso*). Cereals (prepared for food for human consumption) and flour. **Stanbury and Son, Ltd.,** Victoria Flour Mills, Barnstaple, North Devon; Millers.

HANLEYS.—622,328. *Advertised before acceptance. Section* 18(1) (*proviso*). Cereals (prepared for food for human consumption) and flour. **Thomas Hanley and Sons, Ltd.,** Low Fishergate, Doncaster; Millers. To be Associated with No. 458,577 (2523) xlii and another.

New Companies

Overseas Wines and Produce Co., Limited. (380551.) 413-416, Ulster Chambers, 168, Regent Street, W. 1. Nom. cap.: £1,000 in £1 shares. Dirs.: J. S. Blyth, 12, The Ridge, Orpington, Kent; C. H. Franklin, 1, Burcott Road, Purley, Surrey; F. M. Wraight, Little Orchard, Arkwright Road, Sanderstead.

Devon Agricultural Products, Limited. (380565.) 8, The Strand, Torquay. To carry on bus. of manufacturers of and dealers in agricultural lime, etc. Nom. cap.: £100 in £1 shares. Dirs.: C. Boucher, Lincott, Heston Road, Kingsteignton; C. W. Northcott, Providence, Mile End Road, Newton Abbot.

Rainbow Room, Limited. (380644.) To carry on bus. of food manufacturers, brokers and distributors, etc. Nom. cap.: £2,000 in £1 shares. Dirs. to be apptd. by subs. Subs.: L. Hazell, 88, Bramshott Avenue, S.E. 7 (secy.); Lily Ecker, 30, Anson Road, N.W. 2 (clk.).

Sloan's Scotch Bakery, Limited. (380647.) 148, Town Street, Bramley, Leeds. To take over a bus. cd. on at Bramley, Leeds, by Mrs. Winifred Sloan. Nom. cap.: £1,000 in £1 shares. Dirs.: R. N. Sloan and Winifred Sloan, both of Rockcliffe, Hough End Lane, Bramley, Leeds.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.